Co-Creating the Legacy

A process and outcomes study on phase three of the Baboró BEAST! Project

Authors:

Ms. Patsy O'Sullivan
Dr. Lisa Moran
Dr. Cormac Forkan

May 2015
School of Political Science and Sociology,
NUI, Galway

School of Political Science and Sociology
National University of Ireland, Galway
Tel: 00 353 91 492290
www.nuigalway.ie/soc

The School of Political Science and Sociology at the National University of Ireland, Galway, undertakes research on a wide range of areas such as, education, the environment, work, crime and deviance, family care and welfare and public policy.

The views expressed in this report are those of the authors, and not necessarily those of Baboró Management.

Acknowledgements
Our sincere thanks to all the young people, principals, teachers, artists, science and STEM practitioners, parents and Baboró staff who took part in this research. Without their participation and open contributions, none of this would have been possible.

Ms. Patsy O'Sullivan
Dr. Lisa Moran
Dr. Cormac Forkan

Executive Summary

This is the third report that focuses on the learning from the BEAST! project, an educational arts and science initiative that has been developed and operated by Baboró since 2012.

Baboró International Arts Festival for Children has operated for more than eighteen years and focuses on making creativity accessible to children of all ages including babies, toddlers, teenagers and families. Baboró offers direct cultural art provision to children and families and stages an Arts Festival for children in October each year. This includes new and innovative works using art forms such as puppetry, theatre, visual arts and music amongst others. The organisation has developed strong links with schools, communities and educational institutions since its inception. This outreach work is a developing aspect of Baboró's role and in 2012 the organisation established the BEAST! (Baboró: Environment, Arts, Science and Technology) project to work with schools on achieving a higher profile for science/technology (STEM subjects)[1]. This was done by encouraging children and their teachers to explore these subjects through the arts and has included film making, puppetry, theatre and model making and poetry writing amongst other art forms.

Representatives from Baboró engaged with the Ryan Institute, National University of Ireland, Galway (NUIG) in 2012 to create a brief that would attract the interest of scientists, technologists, engineers and other researchers and academics from across the university community to design and deliver science projects to primary school children in County Galway. The project brief invited researchers to devise a series of workshops that would explore the possibilities and realities of designing a 'low carbon' future and its impacts on biodiversity and sustainability. This was an innovative approach that engaged expert scientists and artists working with school children and teachers; to provide a creative teaching and learning environment to change children's attitudes towards science and the environment.

During the development phase, Baboró engaged with the UNESCO Child and Family Research Centre, School of Political Science and Sociology, NUI Galway to carry out a process study review. Researchers from the Centre worked with Baboró to refine the project objectives and design the research study. They produced the first process study in 2012 entitled '*Magic can happen; A Process Study of the BEAST! Project'* which informed the design of the second phase of the BEAST! project in 2013. The second study entitled *'Captivating Children through Cross-Curricular Teaching of Arts, Science and Technology'* was produced in 2013 to document the findings from phase II of the project. This report is the third process study based on the findings from the research carried out by social researchers in 2014. The research objectives are detailed in the methodology section (Chapter Three) and include the design of qualitative and quantitative tools to collect data, observation of science/technology and art workshops, description of the project model and compilation of the process study report offering analysis and recommendations on the future development of the BEAST! model.

[1] 'STEM' subjects include science, technology, engineering and mathematics

The expected project outcomes included impacts for the children around engagement, behavioural change and social development; impacts for the teachers in how they view the use of art to teach science and technology subjects, the creation of a 'Legacy Project' for each of the schools and the documenting of the project model and project outcomes in a process study report.

Three primary schools in Galway took part in BEAST! in 2013 and 2014 and these were selected from the eight schools that participated in the project in 2012. They were located across Galway, in the following locations; Gort, Oughterard and Newcastle, Galway City. The schools served a spread of populations that included a school serving a wide multicultural population and schools from rural and urban populations. The young participants were predominantly in the 9yrs to 12 yrs age group and numbered 69 children in total.

Baboró facilitated briefing meetings for science and arts practitioners to meet with teachers in February and March. They discussed aspects of workshop delivery, timings and other organisational aspects. The project benefited from the increased opportunities to collaborate and teachers felt more involved and committed this year. Social researchers from the UNESCO Child and Family Research Centre, NUIG were also present at some of the briefings in order to engage in the initial phase of the process study. The intervention comprised the delivery of workshops in the schools and these took place over the months of April to June. Each school received 7-8 hours of science, 10-12 hours of Arts workshops. This comprised 9 workshops in total in each participating school. In addition the children took part in field trips to the sea shoreline, Galway Atlantaquaria, Branar Puppet Theatre workshop, An Taidhbhearc, and the TG4 and Telegael production studios.

The research methodology for the process study included a literature review of research on some of the principle concepts that linked the three BEAST! process studies. These included collaboration, creativity, engagement and participation and how these are viewed by the literature to contribute to creative teaching and creative learning. The literature provides a robust definition of creativity (Collard 2014b) and discusses some of the issues that can emerge throughout the process of instilling creativity in different subject areas (such as STEM subjects). The creative agency of all people involved in the process should be recognised and all participants including children should be accorded importance in determining creative tasks and thinking about the creative challenges for young people and how these can work in the classroom and other settings. From Lin (2011) it can be discerned that creativity is a multi-layered concept that involves multiple actors participating in continuous interactive processes of knowledge sharing, learning and engagement. However embedding an ethos of creativity in the curriculum is not a linear or straightforward process. There are numerous barriers to enhanced creativity that include attitudes towards creativity and knowledge, behaviours established practices, time and resources and others that mediate against improving creativity in the curriculum.

The literature points to the importance of reflection as a tool for learning so that participants should reflect on the meaning of their practices, what worked well as well as things that could have been done better. Instilling a culture of creativity is most of all

a learning process that involves constant and continual reflection and (re)configuring ideas about what constitutes creativity and creative engagement. Most of all the participation of children is an important component in this reflective process and in the developing skills that enable their creativity to flourish and be recognised.

The research methodology drew upon a mixed methods approach to capture the project outcomes. This included extensive participant observation at workshops and field trips, focus groups, personal interviews, a survey of parents and purpose built data collection instruments that were administered to children pre and post intervention. The benefits of tracking the outcomes for children over time are highlighted in the literature and findings from the data collection instruments are being tracked over the three years of the project. Three case studies were generated using this material (Chapter Four). Scientists, technologists, the artists, teachers and parents in addition to Funding stakeholders and Baboró staff were interviewed on their perceptions of BEAST! and these findings are detailed in Chapter Five.

All stakeholders expressed positive comments about BEAST! They felt that the project had achieved its objectives for this third year of operation. They were keen to continue their relationship with Baboró and with NUI Galway. Teachers, scientists, the artist and social researchers noted a high level of engagement in the workshops by children and teachers. Children talked about changes in the ways that they perceive science since participating and showed that they had deepened their understanding of the science concepts. Teachers and social scientists noticed that the approach adopted by practitioners allowed usually less able children to participate *'It was a great leveller for all the children especially disadvantaged children; everyone was on a par and helped each other and compromised and the group work was excellent'.* It also facilitated more able children to share their learning or experience. Parents noted their children demonstrated an increasingly positive attitude towards science and that their thinking about the role of science had changed. The children showed a high level of collaboration and this was noted by teachers, arts/science practitioners and social researchers in the three case study schools. The project objective of raising the profile of science in the participating schools was thus achieved successfully as was the objective of increasing the level of team-building and collaboration amongst the young people.

Through the three years of the project the children have had opportunities to engage with the art forms of poetry; sculpture; painting and mixed media; photography; filming; creative writing and script development; puppetry; theatre and set design and construction and computer programming (Scratch Programming). Most importantly, these art forms were taught to the children in highly engaging and collaborative ways. This meant that children were taught about the societal value of the arts and about the importance of collaborating and sharing with others. They were taught about the value of reflecting on their practices and the significance of teamwork. From the inception of the project, Baboró stressed the importance of instilling these values in young people so that they could carry them forward into other activities.

Taking the time to create a reflective learning environment has resulted in widespread benefits to the project. The process studies that have documented the learning from the project have enabled all stakeholder groups to express their reflections and this includes children as well as parents and funding stakeholders. Participants have been

honest in their responses and critically evaluated their own and each other's contributions. It is this that has enabled each year of the project to improve on the previous years' outcomes.

Across the three schools in this third phase of the project the young people learned new skills such as improved online research skills, camera crew skills, puppet theatre construction techniques, sound and lighting effects, story writing and illustration, production of teaching resources and peer teaching skills. They also demonstrated improved reflective and critical thinking. Parents noted a more positive attitude toward science, towards the possibility of science as a career and also more awareness of their environment and 'The why behind everything in nature'

In addition to the widespread collaboration and team working that took place with the young people, collaboration between science and arts practitioners and teachers was also very evident. This was a strong feature of BEAST!, and stakeholders discussed that they appreciated the increased opportunities to collaborate with practitioners: *'The teacher is needed to bring their philosophy, teaching skills, [knowledge of the children] to support the practitioner and need to be involved in the drive and direction to increase their [and the children's] level of commitment'* (Teacher 3)

In relation to the teaching method adopted by the visiting practitioners, there was strong support for the teaching method and for the project model. Teachers were very positive about the benefits of the more open, creative and flexible approach adopted by science and arts practitioners and stated they were adapting their own teaching styles to incorporate cross-curricular and more creative and interactive approaches. Science practitioners identified that they challenged themselves to use more creativity, to be 'child-led' and to incorporate more of the children's 'lived experiences' in order to achieve enthusiasm and participation by the children.

Research participants stated that practitioners were excited by their subjects and this enthusiasm, coupled with the ability to engage with the young people, was seen as a key element of the effectiveness of the model. Teachers stated that children had more 'ownership' of the work when they had significant input into decisions about the work. They felt that it was a very worthwhile and exciting project which challenged them to introduce the creative arts in science and literature teaching in the classroom. Hence, there is qualitative evidence that this model of working has created real synergy in the schools and amongst the practitioners delivering the workshops. This teaching methodology could be successfully transferred to other schools; the model is sufficiently robust to be replicated with the proviso that the key essential elements described in the findings chapter (Chapter Five) and discussed in Chapter Six are in place.

In summary the study has identified the key elements that have enabled creative teaching and learning to flourish in the participating schools and these include:

- The culture and environment of the school should be conducive to creative practices
- Full buy in by school principal and teacher is necessary
- Supportive attention and respect of teaching staff is of great importance

- Openness to the ideas of children, parents, teachers and practitioners must be instilled in the planning and implementation of comparable projects
- Extensive collaboration with expert and passionate arts and science practitioners and throughout every level of the project is critical to its success
- Opportunities for choice and discovery of different art forms is important for instilling creativity and maximising pupil engagement
- Teaching and modelling techniques and strategies for creative performance by building creative skills
- Stimulation and rewarding of curiosity and reflective thinking are important elements of the model and should be embedded in school culture
- Model willingness to experiment, fail and change: trial and error is important to the success of BEAST!

The recommendations arising from the process study findings and are detailed below: -

- There is a requirement for a formal briefing of school principals and class teachers at the early planning stage. This is in order to achieve full 'buy in' by schools and full understanding of the BEAST! project objectives which is important for achieving the full benefits of the project.

- The project found that it was useful to use a facilitator ('Creative knowledge broker') in the planning stage to enable and encourage 'creative chaos' whilst children, practitioners and teachers explore ideas for workshops and to help align the ideas in a cohesive plan: '*To develop new creativity of ideas there has to be space for chaos – similar to brainstorming in discussions*' (AICE 2011: 25)

- There is an identified need for ongoing meetings between teachers and science and arts practitioners to agree practical aspects of the project and to aid good planning. This should include discussions regarding the school culture and ethos; the needs and ability levels of the class group; the roles and responsibilities of teacher and practitioner during workshops and discussion around the science curriculum which will aid decisions around content and harness more learning for the children.

- High levels of engagement were observed in the children when they were involved with more interactive elements of workshops. This has been one of the most successful outcomes of the project as it has facilitated 'deep learning' in the classroom. The findings demonstrate that workshops should continue to be designed to include a wide range of opportunities for interaction in different ways and should be built around the needs of the children participants. This enables the young people to gravitate towards areas which interest them most.

- Collaboration needs to be prioritised at every level of the project and opportunities to collaborate, participate and jointly review should be built into project implementation.

- Teachers would like more access to creative possibilities (such as drama) to be available to teachers to maximise engagement amongst children.

- Dissemination of the project findings is the next phase of the project processes. At present there are videos of BEAST! and downloadable files of the process studies on the Baboró website which interested parties can access. It is recommended that a copy of the report or executive summary should be sent to participating schools and practitioners in order to disseminate the findings to the wider school and university populations.

- Within schools it would be useful to place the key findings of BEAST! on posters so that the wider school teacher population can become more aware of the project outcomes and learning.

- It would be beneficial to further engage parents during the intervention possibly including more exercises for children to do at home and regular updates to parents on the projects. This could be done via the schools' website or through school newsletters.

- Participant schools would like to continue and strengthen their links with Baboró and National University of Ireland, Galway.

- The NUIG funding stakeholder has identified that the project has shown the real benefits in connecting NUIG with the community and in using this innovative approach. The project has an opportunity to enthuse other academics across college disciplines to explore this approach and incorporate the new knowledge gained from this project. *'I would like that the science community (in NUIG) see this as another dimension to their work'*

~

'I feel that the seed has sprouted but it hasn't taken or set down roots yet. It has given us plenty to ponder on and take forward – how to integrate creativity into every level/every subject and appealing to all aspects of the child' **(Teacher 3)**

Table of Contents

Chapter One: Introduction and Description of the BEAST! Project Model

1.1 Introduction

This chapter introduces the three year BEAST! project in greater depth; it outlines the genesis of the BEAST! model, discusses some of the principal motivations of Baboró management for adopting this approach, the roles of scientists and social researchers in NUIG and the aims and objectives of the BEAST! model. Firstly, the chapter begins by discussing the role of Baboró as an organisation that advances the creative arts among children in the West of Ireland. Secondly, the chapter discusses the aims and objectives of BEAST! in greater depth, before moving on to outlining some of the expected outcomes of the project, such as behavioural and attitudinal change among children towards science and the arts and more general impacts on the schools that took part in the BEAST! project. It will then describe briefly the goals of the scientific and artistic strands of the project in the work with the three participating primary schools.

Over the last eighteen years, Baboró International Arts Festival for Children has brought a wide variety of Irish and International productions to children and their families in Galway. These have included performances, workshops, exhibitions and literature events that have showcased the art forms of poetry, percussion, dance, theatre, puppetry, mime, music and visual arts. Baboró aims to introduce new works, highlight new approaches to the arts and provide new engagement opportunities to their young audience. The festival takes place during October each year.

Baboró International Arts Festival for Children began as one element of the Galway Arts Festival in 1994 and the organisation developed into its own dedicated festival in 1997[2]. In the nineteen years since its establishment it has focused on making art accessible to all children including babies, toddlers and teenagers. In 2009 Baboró hosted a conference 'Natural Born Artists - Arts for Early Years in Ireland' which attracted delegates, speakers and artists from the national and international artistic communities. Other recent Baboró events include the 'Culture for Schools' initiative and 'Network Touring', the development of interactive collaborations with artists and venues throughout Ireland to increase arts participation for young people and families. Improving young people's access to the arts is central to the mission statement of Baboró and in particular, that children have the right to high quality creative experiences, regardless of socio-economic, geographical, cultural, physical or intellectual statuses. The BEAST! project marked an exciting phase of collaboration for Baboró, with scientists based at the Ryan Institute, NUI Galway, along with community artists, scientists, teachers and parents. The success of BEAST! Phases I and II, which was encapsulated in children's engagement with science, the arts and their learning about creative processes, precipitated engaging discussions about how Baboró, working in conjunction with other 'creative partners' (i.e. parents, teachers, artists, scientists) could develop and instil a pedagogical legacy with concepts of creativity, engagement

[2] Details on establishment of Baboró and BEAST! Project from Project Documentation/personal interviews.

and collaboration at its heart. This report looks at how this emphasis on 'co-creating a legacy' developed particularly in Phase III (2014) of BEAST! and makes important recommendations on how cultural dynamics in schools might be harnessed to instil an ethos of creative learning.

1.1.1 Outreach work - The BEAST! project

As part of its remit, Baboró engages with families and children in schools and in the wider community. The outreach work with schools has become an important locus of the work and as part of the schedule for 2012, Baboró targeted a cohort of eight schools in County Galway with a new project entitled BEAST! 2012 (Baboró: Environment, Arts, Science and Technology Project). Baboró engaged in an outreach partnership with the Ryan Institute, NUIG to deliver the project. NUIG has access to internationally recognised researchers in the fields of sustainability, environment and development and the Ryan Institute facilitated the recruitment of academic staff along with postgraduate students and postdoctoral researchers to deliver the scientific elements of the project. The Ryan Institute also facilitated the scientists[3] to refine their proposed workshops to make them appropriate for young people. This process of translating so-called 'objective' scientific facts into information that is usable, accessible and interesting for children was an extremely important element of the project throughout Phases I, II and III. To ensure that this was achieved, scientists drew on numerous interactive teaching resources, some of which were developed by educational experts in government departments to teach children about matters like sustainability, wind power and energy usage. To effectively do this, scientists also consulted with teachers to gain experiential and tacit knowledge of dynamics in classroom environments that could affect workshop delivery and the receptiveness of children to using interactive resources like those proposed. In essence, developing collaborative networks between teachers and scientists was critical to the success of the BEAST! project. Because of the success of BEAST! 2012 Baboró decided to extend the project over three years and, taking on board the findings of the study carried out by NUIG entitled '*Magic can Happen – A Process Study Report of the Baboró BEAST! Project',* devised second and third phases of BEAST! to be delivered in schools in 2013 and 2014. The resultant report of the second phase of BEAST! was entitled *'Captivating Children through Cross Curricular teaching of Science, Art and Technology'* (2013).The first BEAST! report recommended strengthening collaborative relationships between teachers, scientists and parents, while the second report observed that many of these recommendations about further instilling collaboration were implemented. This report is the third process study of BEAST! and documents the processes and outcomes of the project in 2014.

1.1.2 Rationale

Baboró identified the rationale behind the establishment of the BEAST! Project;

> '*Arts and creative activities are of enormous benefit for young children as they engender confidence, encourage critical reflection and creative thinking and provide a powerful base for team working, problem solving and future development.'* (Project proposal)

[3] The term 'scientist' includes researchers and academic staff that came from biological and marine sciences, computer science and engineering disciplines.

The original idea for the BEAST! Project was inspired by a project in the UK called 'The CIAO! ARK Project' which worked with technologists, artists and children to create a life-sized ARK art installation and in the process inspired an excitement and interest in science and art in the young participants.[4] The CIAO! Ark project asked young people to think about the following question; 'if you were to sail away in an ark tomorrow, what would you bring and what would you leave behind?' This was to inspire reflection among young people about the role of material items in their lives and transitions to low carbon economies. Subsequent discussion and reflection about the success of the CIAO! ARK initiative also brought Baboró to question the relationship between science, art and how best to design a project that would use art to create new ways of learning science and technology for primary school children. Interviews conducted by researchers from the UNESCO Child and Family Research Centre with Baboró representatives revealed that Baboró wanted to instil creativity in children so that they would value their own creativity, challenging them to think differently about the role of the arts in their lives and in society. This is evident in the following interview extract with the Baboró director;

> *'We wanted to give the children an eye-opening experience, where the world opens up [to them] and they get the excitement that one gets from new learning and the sense of wonder. [We wanted them] to be able to take the new knowledge and explore and create the habit of a lifetime. And we wanted to bring knowledge in a supportive way, contextualise knowledge, so that practitioners would act as facilitators… would journey [with the children], learning and exploring [together].'* (Baboró Director)

The highly significant document 'Arts in Education Charter' (2013, DES) informed the work of BEAST! in 2013 and 2014 and Baboró are involved in the consultation processes of the charter. The central mission of the charter is to place the arts at the centre of the education system. The means of doing this include creating 'arts-rich schools' (ARIS), greater involvement of visiting arts practitioners in schools, reduced cost ticketing for cultural activities and visits to cultural institutions, amongst a range of actions. It can be seen that the BEAST! project aligns very well with these high level strategies and this project has much to offer in terms of the learning from the process studies.

The overall BEAST! project goal was to raise the profile of science and technology in the cohort of primary schools, encouraging the children and teachers to engage with and explore these subjects through the arts. Obviously, achieving this goal presented some challenges for all 'stakeholders' involved in the process including teachers, scientists and artists in terms of maximising young people's engagement in scientific and arts learning. The principle findings and recommendations from BEAST! I and II fed into the formulation of BEAST III in 2014 which led to the decision to focus more activity and attention on three schools rather than on eight schools which was the case in Phase I in 2012. The three schools received a total of 14 -20 workshops from a combination of visiting practitioners that included scientists and artists. This was done on the premise that more workshops would have a higher chance of impacting on the children in the participating schools.

[4] Please see http://www.asf-uk.org/the-ciao-ark-project-oxford-uk-2010 for more information on the CIAO! Ark project

The project aims for 2014 were refined by Baboró in collaboration with the NUIG social scientists and are defined as follows:-

1.1.3 Project Aims for 2014

- To instil or improve levels of confidence, critical thinking, problem-solving, creative thinking, team working and peer teaching in primary school children
- To demonstrate in schools and to teachers the use of the Arts in teaching the school curriculum
- To create a project model that can be replicated easily and effectively and be used by others to teach and to evaluate

1.1.4 Project Objectives

- To marry Science, Technology (STEM)[5] and the Arts in exploring a 'Low Carbon Future' with primary school children through a series of workshops delivered by Scientists and Artists
- To create an artistic response using the children's understanding of the topic and as a method of expressing that artistic reaction
- To design and/or source quantitative and qualitative tools to collect data
- To observe workshops and document behavioural and attitudinal changes to evaluate the impact of the project
- To identify the impact of how the BEAST! project has affected how Baboró have developed in terms of practice, change processes and focus over the three years of BEAST!
- To write a process study report offering critical thoughts on the process and possible future developments for BEAST! Project
- In this third and final year of BEAST! the project had the additional objective of working with the children to create a lasting legacy of the BEAST! project that would remain in the schools after the project ended

1.1.5 The Expected Outcomes

The expected outcomes were identified with Baboró and the NUIG social researchers at the early stage of the process study. The initial expected project outcomes included:

a) Impacts on the children relating to engagement, behavioural change and social development both in and out of school
b) Impacts on the ways the children engage with learning
c) Impacts on how teachers view the use of art in teaching the science and technology curriculum and across the wider curriculum
d) The production of a lasting artistic legacy by each of the 3 schools
e) The continued documenting of the project model that can be replicated by other educational organisations working with children. (Process Study Report Three)
f) The continued documenting of the learning created through the delivery of the project (Process Study Report Three)

[5] 'STEM' refers to the initial goal of increasing interest in young children in Science, Technology, Engineering and Mathematics subjects.

1.1.6 BEAST! 2014 Process Study

The staff and management of Baboró were conscious of the need to compile social scientific data on the various impacts that the project might have on the children, as well as the other participants who were involved in the project, such as the teachers, artists and scientists. As a result, representatives from Baboró contacted researchers at the UNESCO Child and Family Research Centre, NUI Galway to conduct a process study of BEAST! and the social researchers have been involved in the evaluation of the project since the early planning stages in 2012. In particular, as Baboró were interested in documenting the engagement of individual children in the classroom with scientific and artistic topics and in monitoring any behavioural changes which might occur as a result of the project, the social researchers were interested in conducting a benchmark of children's sense of belonging, attitudes towards science and nature and their feelings about school. While some changes in children's attitudes to science were discerned, it was impossible to attribute all behavioural changes observable in participating children to participation in the BEAST! study. Nevertheless, in-depth data collected through interviews and Participant Observation (PO) enabled the researchers to reveal some complex patterns underpinning children's reactions to the different topics and their sense of engagement in the creative process. Furthermore, the quantitative tool documented interesting patterns in children's knowledge and understanding of creative processes, their attitudes to science and the environment, which were highly significant overall.

1.2 Project Details

1.2.1 The BEAST! 2014 - Project Staffing

One member of Baboró staff was dedicated to manage the project part time over the project time frame. One member of staff provided administrative support to the project on a part time basis. Two further members of management staff were involved in the project design and implementation. One photographer was employed to record the workshops using still camera and video camera to form a visual record of the work done with the children. In addition a further thirteen practitioners from different disciplines were involved in direct delivery or in supporting roles. This comprised: four NUIG researchers; five Scientists; four Arts practitioners and five teachers based in the 3 schools providing support to the science and art practitioners as they delivered their workshops to the children. A total of 18 people were involved in the project and all of these were involved on a part time basis.

1.2.2 Funding

Baboró received funding for the BEAST! 2013 Project from the following bodies: -

- NUI Galway 'Bright Ideas Innovation Fund'
- Science Foundation Ireland (SFI)
- The Ireland Funds
- Forum Connemara
- Galway City and County Enterprise Board (GCCEB)
- Galway County Council (GCC)

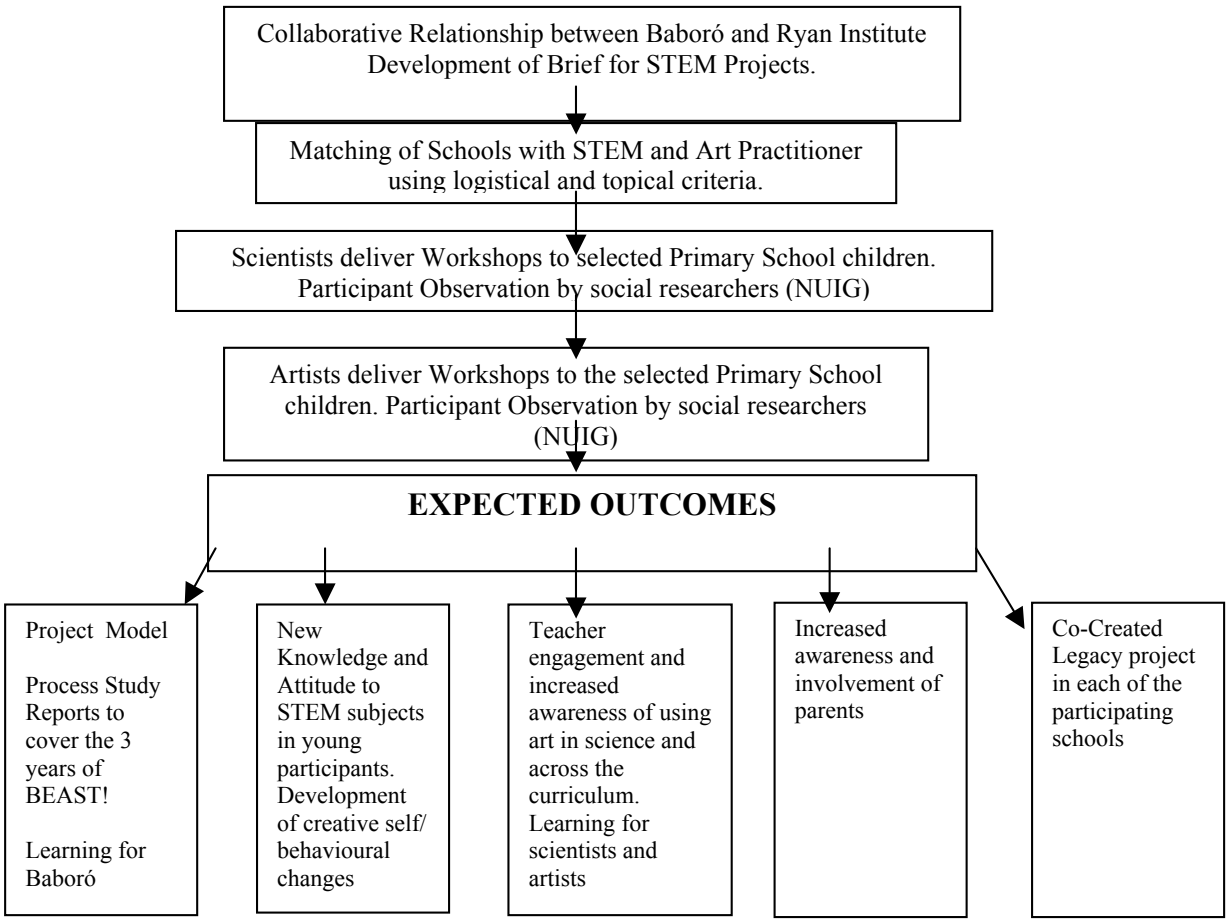
1.2.3 The School Cohort

Three primary schools participated in Phase III of the project and these were selected from the eight schools that had taken part in the first phase of the project in 2012. They were situated throughout County Galway and were located in Gort, Oughterard and in Newcastle, Galway City. The schools served a range of populations with one school serving a disadvantaged population, one school that serves a wide multi-cultural population with increased needs for language support and learning support and one school serving a rural and bilingual population. The total cohort of children involved with the project in Phase III comprised 70. They were primarily children from 4th, 5th and 6th Classes aged from nine years to twelve years.

1.3 The BEAST! Model

The discussion and planning for the BEAST! project took place over a 12 month period from 2011 and involved consultation with the Ryan Institute at NUI Galway, scientists and other arts practitioners in Ireland and in the UK. After the research phase a model of delivery was designed and was further refined after BEAST! 2012 and 2013 and is outlined here (see Figure 1 below):

Figure 1. Baboró BEAST! Model 2014



1.3.1 The Scientific Engagement

In early 2012 Baboró approached the Ryan Institute (NUIG) to collaborate in the delivery of the project. The Ryan Institute sent out a call to all university departments (see Appendix I), which detailed the brief for proposals to run 3 science (STEM) workshops (1½ to 2 hours each) with primary schools in County Galway. There was an enthusiastic response from the academic community and the project outcomes have been detailed in '*Magic can Happen - Beast! Project Process Study Report One'.* Following on from the findings of the process study in 2013, Baboró decided to focus the project on the three schools and selected three scientists to work with individual schools. In this third year of the project five scientists from NUIG worked with the three schools. This is outlined in more detail below.

1.3.2 The Science Project Topics

The scientists were all researchers from NUIG and are experts in their field of research. All had prior experience or knowledge of the project from the work in 2012 and 2013 and for this set of workshops the brief provided by Baboró was broad. It was to design a series of four 1 ½ - 2 hour workshops that would teach concepts of science using as illustration their area of research in a way that was age appropriate and that would include discussions around the environment and a 'low carbon future'. From experience in 2012 and 2013 scientists knew that the children responded very well to 'hands on' exercises. The projects undertaken in each of the schools which took part in the BEAST! 2014 project are outlined in Figure 2 (below);

Figure 2: List of Schools and Projects Descriptions

School	Project Description
Galway Educate Together National School Newcastle, Galway.	**Peer teaching / Salt Water Native Species Aquarium.** This project continued to explore the interconnectedness of marine life off the coast of County Galway and also inspired young people to think about international marine environments. It resulted in the Legacy Project of the creation of a salt water aquarium containing native sea life from the Irish coastline and the production of teaching packs designed by the children to be used in peer teaching sessions.

Scoíl Inse Guaire, Gort	**Alternative Energy/ Puppet Theatre design and construction** – Energy generation and personal power production. Storing and converting energy and harvesting energy from natural resources and from and people during motion. The production of a puppet theatre powered by alternative energy.
Scoíl Cuimín agus Chatríona, Uachtar Ard, Co Galway	**Green Energy for smart energy consumption/Video production by children** showing their new school's innovative Green technology design.

1.3.3 Initial Project Briefing

Baboró brought together the scientists, artists, teachers and social scientists at a range of briefing meetings in February and March 2014 to engage in planning for the BEAST! 2014 project and to agree workshop scheduling and other organisational details. This was followed by meetings between the scientists, artists and teachers in the schools to agree an overall theme informing the workshops that they would deliver during workshops.

1.3.4 The Artistic Engagement.

Baboró has developed relationships with arts practitioners who have experience of working with school children over many years of engagement within the arts community. For the 2014 project, Baboró selected five different artists to deliver workshops to the children that would support the children to engage with art and with science as they produced their legacy project. The artists aimed to create an interest and enthusiasm in the children by stimulating an emotional and compelling involvement with the workshop themes that would have a lasting impact. The themes were around the science topics, environmental issues and renewable energy, concepts of story boarding and puppetry, art collage techniques and painting and woodwork. These and other skills were developed in the children to facilitate them to develop individually and in groups, the creative output and imaginings that would be used in the production of their legacy project. (Details of the individual legacy projects are described in Chapter Four)

1.3.5 The Schools Engagement

Schools provided extensive support to the project in terms of timetabling children to be free for workshops, providing educational and other facilities and in being adaptive and flexible supports to the practitioners. One of the objectives of BEAST! is 'To demonstrate in schools and to teachers the use of the Arts in teaching the school curriculum' or in the words of the Baboró Director *'art practitioners demonstrate to teachers how art can be used to deepen the learning around science and technology'* . There was significant interest in the project within the school communities and often there was more than one teacher present at workshops. Teachers were not there in an

observational capacity but to lend hands-on support to the practitioners, often contributing by making links with the children's existing learning. The teachers' considerable insights on the teaching approaches used by the practitioners and of the possible impact on the school curriculum are detailed in the three case studies and in the discussion section of this study.

1.4 Report Structure outline

The following outline summarises the layout and content of subsequent sections of this report;

Chapter Two: Literature Review: In this chapter, the literature surrounding important aspects of the BEAST model is reviewed, and linked with the learning from BEAST! I and II. This includes a more robust definition of creativity, ideas around cross curricular teaching and the benefits and challenges of using art for teaching science and STEM subjects and collaboration between arts and science practitioners in primary level education. This emphasis on the concepts of creativity and collaboration are embedded in this chapter as they are the 'uniting' or 'cornerstone' concepts that underpin all three phases of the BEAST!

Chapter Three: Research Methodology: This section outlines the methodological approach that was taken by the researchers who combined a range of qualitative and quantitative methods to gather data in the schools under study. Such methodological techniques include Participant Observation (PO), in-depth interviews, focus groups and a survey questionnaire. This research was informed by in-depth understanding of literature on the ethics of researching children and how to design and conduct 'child friendly' methodologies.

Chapter Four: Three Case Studies: The three schools where the research took place are described in this chapter, Scoíl Cuimín agus Chatríona, Uachtar Árd, County Galway, Galway Educate Together National School (GETNS), Galway City and Scoíl Inse Guaire, Gort, County Galway. This chapter also describes the projects that were rolled out in each of the three areas

Chapter Five: Research Findings: The main findings of the project are outlined in this section. In particular, this section focuses on issues to do with engagement and attitudes towards creativity of all stakeholders in the project.

Chapter Six: Discussion and Recommendations: This part focuses on the extent that the BEAST! 2014 project managed to achieve its aims and makes recommendations on how the BEAST! Model can be further developed and adapted by a wider community of schools, parents, scientists, academics, arts practitioners, etc.

Chapter Two: Literature Review

2.1 'Contextualising Creativity': Introduction to the BEAST! Model and Developing a Conceptual Framework for BEAST! Phases I, II and III.

This literature review critically examines social scientific literature on topics that relate to components of the Baboró BEAST! Model, its development and implementation in case-study schools. The aims of this section are manifold. Firstly, this section builds upon and synthesises the research literature that was presented in the first two process studies, thus marrying together the integral strands that are characteristics of the BEAST! I, II and III. Secondly, it develops a more robust definition of creativity that emerged throughout the emergent interactive processes of engagement between multiple actors (teachers, children, parents, artists) during Phases I, II and III. of the BEAST! Project. Third, this section also focuses on concepts related to creativity as they were developed in the BEAST! Model, in particular, concepts of 'the curriculum', 'cross curricular teaching' and 'cross curricular learning' which were key characteristics of the pedagogical approach adopted throughout BEAST! phases I, II and III. The implementation process is also critiqued and the process of embedding some core BEAST! principles into primary school teaching and learning agendas. As will be argued in this section, this is not straightforward or linear. A culture around the active participation of children in the curriculum which values their creativity is necessary so that learning from the BEAST! Model can be incorporated into primary school curricula. Some of the main issues around this are highlighted here.

Some of the core recommendations identified in the first BEAST! process study (2012) was as follows; that primary school science curriculums are often highly prescriptive, lack access to sensory experiences and interactive aspects of learning. Such learning experiences are extremely important for stimulating the minds and imaginations of young children. The first study also stated that such highly prescriptive approaches to learning can facilitate 'surface learning', rote learning and repetition of factual pieces of information, instead of 'deep learning' which is embedded in people's life experiences, their social interactions and lived realities. Such findings corroborated strongly with the literature which also argues for more interactive opportunities for children and young people to develop their own individual talents, learn more about themselves and value their contribution to society (cf. Murphy and Beggs 2003).

Studies also argue for more opportunities for collaboration, teamwork and engagement to be enmeshed in primary school curricula (Varley *et al*. 2008). Recent literature on science teaching, the curriculum and education also argue for highly interactive methods of instruction which foster the creativity and contribution of young people. Some of the other core topics which were explored in the first BEAST! Process study (2012) was children's relationship with the 'natural' environment which was integral to the pedagogical approach of BEAST! Projects, facilitating deeper engagement of young people in STEM subjects through tactile and other sensory experiences. Young people's relationships and interpretations of nature were also reflected in various ways in the

arts installations produced by the children who worked collaboratively with artists and scientists.

The literature review from the second BEAST! Process study (2013) focused on research literature that further supported the emergent Baboró BEAST! Model which had undergone some transformations as a result of the findings and recommendations in the first study. This process study explored in-depth, evaluations of the *Creative Partnerships* initiative which fostered collaboration and creativity of teachers, young people and arts practitioners and focused on the impacts, benefits and challenges of using cross-curricular teaching for science teaching at primary level in the UK. The *Creative Partnerships* was comparable to the BEAST! Model in a number of ways as it brought together diverse actors (artists, scientists, architects, multi-media specialists, teachers and children) facilitating science and language instruction at primary and secondary level through artistic engagement of young people. Subsequent evaluations of *Creative Partnerships* revealed significant payoffs for young people's learning, self-efficacy, self-esteem, motivation and confidence.

This second BEAST! evaluation also focused on a related topic; the use of ICT in teaching at primary level and the learning outcomes accrued through enhanced collaboration between parents, teachers, artists and children in ICT education. Such topics reflected the findings and recommendations made in both the 2012 and 2013 BEAST! process study Evaluations about science learning and the importance of social interaction in improving young people's feelings of self-confidence and learning around ICT and STEM subjects in schools. This chapter incorporates and draws upon these insights of the 2012 and 2013 works and develops other insights based on more recent contributions to the social theoretical literature. It subsequently marries these insights together with concepts and 'umbrella terms' which encapsulate and bring together the three distinctive, yet interrelated phases of the BEAST! Study (2012, 2013 and 2014).

The remainder of this chapter is divided into four principle sections. The first section (2.2) focuses on the concept of creativity and how it is conceptualised in social scientific educational studies. It argues that significant emphasis has been accorded to creativity and partnership approaches by policy-makers, theorists and in educational programmes, particularly in more recent times. The literature also illustrates that there is greater emphasis around concepts of collaboration and partnership between actors (parents, teachers, arts practitioners, children and young people) in science education, but also in other types of policy interventions. This is highly significant as concepts like participation and partnership draw attention to the importance of social relationships to young people's learning and the significance of developing interpersonal skills and 'multiple intelligences' for science education. However, the meaning of these concepts is contested and this can be problematic when instilling a culture of creativity in the curriculum to a degree. Part 2.3 focuses on the curriculum and documents case studies of projects which encompass comparable elements to BEAST! – the *Creative Partnerships* and the *Cultural Rucksack* initiatives. Subsequent evaluations of these projects provide further evidence of the improved developmental and learning outcomes for young people through participating in creative projects. Part 2.4 looks at issues and challenges around instilling an ethic of creativity in the curriculum and makes recommendations for artists, teachers, scientists and parents on how this might happen more effectively. A theoretical model is also constructed on how some of this

embeddedness of creative principles might be achieved. Part 2.5 gives a summary of the chapter and some conclusions and recommendations.

2.2 '(Re)-conceptualising creativity and cross-curricular engagement': critical approaches to creativity and creative education in primary education

Examining Concepts and Discourses of Creativity and Creative Education

Within the social science literature, the recent impetus around creativity and the notion of 'creative education' forms part of broader social, cultural and policy moves away from 'traditional', didactic and 'teacher centred' modes of instruction at primary, post primary and third and fourth levels. There is greater recognition around the pedagogical value of more interactive, collaborative modes of teaching and learning which focus on the talents of individual children and young people, their contribution to the learning process and the relationships between teachers, parents and young people. Broadly speaking, this concurs with the emphasis that is often placed on young people's participation in society which is widely discussed in the social theoretical literature (cf. Checkoway 2010) and in international youth policies is precluded by recognitions that young people's creativity is important for society and must be nurtured. In the Irish context, there is also a marked emphasis in policy on 'whole child perspectives' which incorporate different facets of children's development and wellbeing, the voice of the child and improving outcomes for children's lives (cf. Forkan *et al*. forthcoming). Such perspectives draw attention to the physical, emotional and creative elements which shape and reflect the social development of children and young people and their learning. Nevertheless, such an emphasis on children's participation and creativity raise questions about how creativity can be fostered by teachers in a practical sense in the classroom in everyday life and the opinions of teachers about their confidence and abilities in engaging with children using teaching strategies designed to enhance creativity. This also asks questions about current teacher training practice in Ireland and the opinions of teachers about embedding the creative arts in the 'formal' science curriculum at primary and second levels.

Particularly in more recent times, the concept of creativity has gained traction in social science literatures in the 'field' (Bourdieu 1990) of education (see for example Shaheen 2010). While definitions of creativity that appear in the literature are multifarious, there appears to be broad consensus among many educational philosophers and theorists that creativity enhances the educational experiences of teachers, children and 'other actors' that are usually 'external' to the classroom but are nonetheless pivotal to children's learning (i.e. parents). As Lin (2011) states 'there seems to be a consensus view within the realm of education that creativity is amenable to teaching' which further highlights the significance of creativity as incorporated into pedagogy (p. 149). Internationally, the European Union (2009) and UNESCO recognises the importance of creativity for primary education stating that creativity is essential for building healthy relationships and creating a culture of mutual respect and enhancing young people's self-esteem. UNESCO states that;

> *The encouragement of creativity from an early age is one of the best guarantees of growth in a healthy environment of self-esteem and mutual respect - critical ingredients for building a culture of peace (p.3)*

Obviously, the degree of incorporation of creativity into individual curricula is highly contextual dependent on factors such as the culture of schools, attitudes of key actors (teachers, policy makers, scientists, artists) and definitions of creativity which are contested. For example, in 2009, the Irish National Teachers Organisation (INTO) produced a Discussion Paper around creativity in primary school education and acknowledged the somewhat elusiveness of the concept of creativity (p. 3). However, they also adapted a highly interesting definition of creativity to contextualise the paper:

> *Creativity can be understood as having the power or quality to express yourself in your own way. Children are naturally creative. They see the world through fresh, new eyes and then use what they see in original ways. One of the most rewarding aspects of working with children is the chance to watch them create (p.3)*

Significantly, the INTO (2009) paper states that creativity needs to be nurtured in young people and children need opportunities to express and develop their creativity. This is also reflected in their concept of 'creative learning'

> *Every child is born with creative potential, but this potential may be stifled if care is not taken to nurture and stimulate creativity. Young children are naturally curious. They wonder about people and the world. Even before they enter primary school, they already have a variety of learning skills acquired through questioning, inquiring, searching, manipulating, experimenting, and playing. Children need opportunities for a closer look; they need time for the creative encounter…Creative learning is a natural human process that occurs when people become curious and excited. Children prefer to learn in creative ways rather than just memorising information provided by teachers or parents. They also learn better and sometimes faster (pp. 3-4).*

The INTO (2009) paper states that creativity goes beyond the initiation of arts projects in schools. Instead, it is conceptualised as an ethos, a classroom culture where teachers captivate the imaginations and minds of children. Creativity is about 'experiencing the unpredictable and the uncertain' challenging the boundaries of what is possible, it is about 'creating people' and involves a two-step process of thinking and producing something (Naiman n.d. cited in INTO, 2009 p. 4). Significantly, the INTO Discussion Paper (2009) states that while children have an endless supply of creative energy, as they mature, they seem to lose some of this energy. As they get older, they seem less likely to take risks, adapt more conformist behaviour and become less playful and spontaneous in their reactions and emotions (p. 4). According to the INTO (2009), the challenge is to enable all children to flourish regardless of social background and to create an environment where artistic flourishing can happen (p. 5).

Teaching as a creative practice: defining creativity in the classroom

While the notion of creativity and collaboration has grown in prominence in the educational literature particularly more recently, creativity has a relatively long history in the social sciences field. Indeed, Sawyer (2004) argues that teaching is essentially a 'creative performance' and that effective teaching is 'improvisational', constituting co-created knowledge cultures between children and young people. Furthermore, in the

1950s, Guildford and Torrance created psychometric tests designed to measure people's creativity, thus showing the significance of the concept from the mid twentieth century on. Recently, the Artists in Creative Education (AICE) project outline a robust approach to creativity which appears to concur with many aspects of the BEAST! Model. According to AICE (Collard 2014b) there are four essential characteristics to the creative process;

> *Our starting point is to recognise four characteristics of creative processes. First, they always involve thinking or behaving imaginatively. Second, this imaginative activity is purposeful... Third, these processes must generate something original. Fourth, the outcome must be of value in relation to the objective. We therefore define Creativity as: Imaginative activity fashioned so as to produce outcomes that are both original and of value.*

From this perspective then, creativity is an imaginative process which embodies the cognitive (thinking and reasoning) abilities of actors and their behaviours. However, creativity involves interaction and produces social outcomes which are valuable for society and to some degree are original or characteristic. Creativity then is about valuing the contribution of young people, their imaginations and expressions of themselves and teaching young people to value their unique contributions to society.

There are debates in the literature on the extent that traditional, didactic teaching methods foster creative engagement of young people in the curriculum and the learning benefits of didactic versus interactive teaching methods for children and young people. However, some works postulate that the choice of teaching methods which work best cannot be an 'either/or' scenario and that in some cases, didactic approaches may be more suitable to children's learning, depending on factors such as age, gender, socio-economic backgrounds and subject matter. Nevertheless, there are numerous reports both in Europe and internationally which recognise the importance of creativity in the curriculum but which show that the arts are often overlooked in science curriculum development and teaching, learning and assessment strategies. However, there is evidence which suggests that some levels of creativity are becoming more embedded in primary school curricula. The British National Foundation for Educational Research (BNFER) (2004) conducted international research in 2004 with educational experts in 22 countries on creativity through arts education. This study emerged from the efforts of The Qualifications and Curriculum Authority (QCA) which focused on how the arts can maximise the academic performance of pupils in British primary schools. The QCA later commissioned the National Foundation for Educational Research (NFER) to examine the place of the arts in the curriculum in countries participating in the International Review of Curriculum Assessment Frameworks Project (the INCA project) (cf. O'Donnell 2004). It found that arts forms such as dance and drama were studied in most countries and attitudes are positive towards the arts in primary and secondary curricula. Furthermore, there were high expectations among survey participants that there would be important social, cultural and economic pay-offs from learning arts subjects in schools. However, the degree of 'enmeshing' of creativity and the arts into other disciplines such as science and languages is noticeably low. Indeed, subject areas were treated mainly as 'stand-alone' entities and there was little overlap between the creative arts and the sciences for example. Ireland was a participant in this international study, along with countries such as Australia, Britain, France, Singapore

and the United States of America. Overall, it is observable that level of enmeshing around creativity into 'formal' subjects such as languages, sciences and mathematics is relatively low overall. However, that said, there is further evidence to suggest that the language around enhancing creativity in the curriculum is becoming more embedded in educational cultures in Ireland and internationally. The next section focuses on the concept of 'creative education' and some of the strategies that can be used to embed creativity at three distinct levels or layers; in individual subject areas, classrooms and schools. This section also asks how and to what extent creative education can improve the academic attainments of pupils, highlighting some interesting literature around this topic.

2.3 Creative Education, Teaching Scripts and Knowledge Co-Creation

Given the emphasis on creativity, the concept of 'creative education' and its impacts on young people and the curriculum has also increased in prominence in the literature. Sawyer (2004) for example, argues that creative teaching and creative education encompass a number of characteristic elements; it is 'disciplined improvisation' in that teachers draw on teaching and learning 'scripts' that they know 'work' in classroom environments, enabling them to cope with situations as they arise in these settings. However, these scripts are balanced with appropriate degrees of improvisation and flexibility in classroom situations; adaptation strategies that enable teachers to react effectively to various external classroom conditions. For the BEAST! Model, such insights are significant; throughout project phases 1, 2 and 3 teachers, scientists and arts practitioners applied and co-developed novel scripts aimed at creative engagement in the classroom. Indeed, the concept of creative education also underpins much of the BEAST! Model as developed throughout the three years; the model continually sought to foster engagement of various actors through the medium of art but also perpetuated the notion that science itself is art by stressing the underlying linkages between science and artistic enterprises (model making, sculpting and poetry for example). The concept of 'Creative Teaching' is also central to work by Ada (1986) which argued for more creative pedagogical strategies in bilingual teacher training in the US. The concepts of 'creative learning' and 'creative teaching' are therefore interlinked. Drawing on the INTO Discussion Paper (2004), children can learn creatively but also require an environment which is conducive to creative flourishing ('creative teaching').

Looking more in-depth at the concept of creative teaching is now warranted. The concept of creative teaching can connote many different things. After all, teaching is a highly creative activity and the generation of knowledge in the sciences and the arts is inherently creative. However, creative teaching embodies more than an occasional arts class. It means valuing the pupils and recognising the different ways that each child expresses her/his imagination through drama, reading, poetry, sculpture, drawing, sketching, painting, dance etc. It also implies adapting teaching strategies and a general teaching approach (teaching philosophy) that puts creativity at the core. It means liaising with like-minded people about the value of creativity, different ways and approaches to enhancing creativity in the classroom and being willing to try new things that maybe do not work out when first tried out. Creativity implies flexibility, knowledge-sharing, fostering an ethos which values interaction and relationships and recognising how one can constantly improve one's own teaching practice. This idea is developed and returned to in the next section (2.4).

Conceptualising the Curriculum: The Curriculum as Creative Engagement, Social Interaction and Child Flourishing

In more recent times, the educational research literature has also emphasised the concept of curriculum. In the Irish context, this is partially as a response to government policies around the 'Knowledge Economy' and the creation of a 'Knowledge Society'. Internationally, and at a European level however, the emphasis on curriculum also emerges in relation to calls from educational theorists to embody greater student participation in curriculum planning and development and more emphasis around recognising the child's voice in education. Diverse conceptual approaches to the curriculum exist within the literature and indeed, multiple definitions of 'the curriculum' appear in social science publications (cf. Barnett and Coate 2005). Indeed, some approaches to the curriculum are static suggesting that engagement in classrooms is more linear (i.e. two way system of information transfer from teacher to student), while more recent theories suggest that the curriculum is a multi-layered process of engagement of all actors involved in the educational enterprise (children, young people, teachers, parents etc.). However, recent social science studies apply a more 'open' approach, conceptualising the curriculum as a process of knowledge exchange between actors, stressing the value of people's contributions and interpretations of the curriculum. From these perspectives, the curriculum in any subject and how it is taught is not irreducible to linear teaching methods which hold that educators are experts and largely discount the roles of young people in co-producing knowledge. Instead, such perspectives place emphasis on the behaviours, knowledge, discourses and creative expressions of children and young people in various guises which are mainly discounted in 'linear' teaching models. These linear approaches which largely discounted the child's voice regularly appeared in the literature but largely negated the multiple intelligences of young people and the learning benefits for adults from engaging in creative processes with children and young people.

In more recent times however, the concepts of curriculum and creativity have been linked, drawing into sharper focus how children, parents and teachers co-create the curriculum. Lin (2011) argues that much of the literature around creativity in the curriculum can be divided into 3 major areas; 1. Concerns about teaching and how to develop effective pedagogical strategies to foster creativity in the classroom, develop higher-order thinking and multiple intelligences. 2. How to create a stimulating learning environment that improves learning and 3. Teacher ethos and the emphasis placed on independent thinking in classroom environments. From Lin (2011), it can be discerned that creativity is a multi-layered concept that involves multiple actors participating in continuous, interactive processes of knowledge sharing, learning and engagement. However, embedding an ethos of creativity in the curriculum is not a linear or entirely straightforward process. Indeed, there are numerous barriers to enhanced creativity and creative teaching which are both extrinsic and intrinsic to individuals including attitudes towards creativity and knowledge, behaviours, established practices, time, financial resources and predominant organisational cultures that mediate against improving creativity in the curriculum. It is important to note that the curriculum encompasses not only the content of individual modules but also how they are delivered, the type of learning environment and the mode of assessment. Envisioning the curriculum as creativity itself, means that the creative agenda is incorporated into the various aspects of teaching and learning.

The *Arts Alive!* Website, which culminated from the QCA (2004) study, is an important example of how multimedia resources can be developed to provide guidance to schools and other actors on how they can work interactively with the creative industries and businesses to enhance creativity. A recent blog by the Master of Wellington College, Sir Anthony Seldon is included on the website which highlights the importance of an arts education to the achievement of academic success. This may be an example of how discourse around the importance of the arts in education has permeated into society suggesting that there is a heightened credence now being given to the arts in educational policy;

> *Do we truly understand the purpose of education? Do we really think that going to school is only about achieving good exam results? Ministers – and the education establishment – can give the impression that exam results are the Holy Grail, the only way to judge the accomplishment of schools and students. Of course, we recognise the vital role exam results play in evaluating the effectiveness of funds and policy. There should be measures of accountability and goals to aspire to. But in pushing education to new heights we must not lose its breadth.*

While the importance of the arts in education has been established, it is important to critique this link a little further and question the evidence surrounding whether or not arts education benefits children from higher and lower socio-economic backgrounds and whether other factors such as age and gender might also shape educational outcomes, as well as length of time engaged in creative practices. There is however a wealth of literature demonstrating the value of interactive approaches to teaching and learning for young people's self-efficacy and confidence as learners, which are also extremely important elements of the learning process. This has been demonstrated for example with children from low income families, in communities which are formally classified as 'socially marginalised' and in situations where the self-efficacy of young people as learners is low. Evidence suggests that creativity bolsters the learning outcomes and performance of young people whose self-efficacy, self-esteem and motivation to learn is high to begin with. However, it also improves children's self-confidence whose feelings of self-efficacy may have been lower in the first place. This suggests that there may be tangible learning benefits from enhanced creativity for young people which transcend the impacts of some socio-economic and demographic factors on young people's learning. This was evident in two case studies provided here; the Creative Partnerships and the Cultural Rucksack project which suggest that enhancing the role of the arts can enhance educational outcomes for young people from so-called marginalised backgrounds.

'Creativity in the Classroom': The Creative Partnerships Model

Previous BEAST! Evaluations focused much attention on *The Creative Partnerships* initiative, the UK government's flagship creative learning project. The *Creative Partnerships* is now recognised as a world leader in the educational field, marrying together science, art and creativity. The project worked with over 1 million young people to stimulate enthusiasm for creativity, science and learning. Subsequent evaluations of the *Creative Partnerships* programme highlighted that the project impacted markedly on young people's learning in areas such as science, maths and the development of interpersonal skills. Moreover, qualitative and quantitative evidence garnered from these evaluations suggest that the development of 'softer' skills and

interpersonal development among children bolstered their performance in the 'hard sciences' including mathematics.

Interestingly, *The Creative Partnerships* suggested that socially marginalised young people who took part in *Creative Partnership*s performed particularly well at Key Stages 3 and 4. Absence levels were also lower in *Creative Partnership*s participant schools compared to schools located in comparable socio-economic areas which did not take part in the project. This implies that such interventions might improve retention and attendance rates. Significantly, the *Creative Partnership* evaluations also illustrate that other participants in the creative process benefitted from the process including parents and teachers. Central to this was the 'openness' and 'fluidity' of the pedagogical model which worked to foster interaction and positive relationships between children and adults and create a learning environment which was conducive to knowledge exchange. While studies of the *Creative Partnership* initiative share many commonalities with the BEAST! Model, the comparisons between them should be taken with a note of caution for a number of reasons. Firstly, the sample size of BEAST! is much smaller than the *Creative Partnership*s studies. Secondly, the timeline of the Creative Partnerships encompasses a much longer timeline than the BEAST! Project and third, the socio-cultural contexts of arts and science education in Ireland and the UK are somewhat distinctive, although there are some comparisons between both systems. Nevertheless, it is important to outline the significance of the Creative Partnerships to the BEAST! Model as creativity, collaboration, social interaction and partnership were encompassed in both. In the context of the *Creative Partnerships* study, a multi-actor approach to participation and collaboration was adopted which emphasised relationship building of artists, scientists, teachers and children. It is the embedding of creativity and idea sharing within an ethos of partnership and relationships that distinguished the *Creative Partnerships* from other types of arts education.

'Moving Creativity Forward': The 'Cultural Rucksack' (Den Kulturelle Skolesetten) Project

Recent research work on similar projects to do with creativity, culture and learning also highlight that participating in these initiatives has many positive benefits for children; fostering a sense of ownership around learning materials and greater enjoyment around the process of learning. Collard (2014) documents findings from the *Cultural Rucksack* project in Norway which worked with young people aged 13-18 years across a six month period. This study married together creativity, culture and arts education. The project highlighted that participating in an active and creative fashion yielded enhanced learning outcomes for young people. Qualitative evidence suggested that young people's experiences with the project were positive. Children who were interviewed expressed positive attitudes towards the programme which aimed to actively engage them in the creative process. For example, as part of the intervention, children were brought to an art gallery where the artist devised a game for them. They were asked to walk around the museum, locate any artefact that they liked and draw that artefact. They were then asked to give the drawing to another young person who had to locate that same artefact. Young people expressed highly positive attitudes towards these strategies as they actively talked to one another about the artefact and why they liked it. It also led to deepened cultural learning as many of them explored the entire art gallery in just two hours. This collaborative method led to deeper questioning among the children about why they liked particular artefacts and awakened new ideas

and interest about material culture. Recent published work also corroborates the approach of *The Cultural Rucksack* highlighting that children's engagement with science, the arts and culture is sometimes heightened through museum field trips (cf. Andersen et al. 2000). However, strategies need to be designed which also heighten the creative imaginations of young people, enabling them to question the meaning of cultural artefacts and their own interpretations of them. Some preliminary recommendations around some strategies that should be drawn upon by artists, scientists, parents and teachers are provided in part 2.4.

2.4 'Embedding Creativity in the Curriculum': Developing Pedagogical Strategies for Multi-Level Curricular Engagement

The research around creativity, education and children's learning inevitably raises questions about how creativity can be enhanced in classroom situations and pedagogical strategies that can be developed and utilised by teachers to improve creative engagement of young people in the curriculum. Some case-study research exists documenting ways that creativity can be effectively embedded into science curricula and in the classroom. However, this literature is sparse and there are only a few 'toolkits' available which offer guidance to practitioners. Some of the main recommendations outlined here are drawn from Collard (2014), while others represent some of the learning from BEAST! And a comprehensive literature search. Some of the core questions and issues that might usefully guide the embedding of creativity in the curriculum are also looked at here. We develop a five stage model of planning, implementation and evaluation which should help schools to think about the type and model of creativity they wish to implement. Elements of this model should be incorporated by schools implementing a creative approach. Self-reflection and dialogue are critically important throughout each of these stages. We also draw upon Collard (2014) who develops a five stage model for artists working creatively with children in schools.

Creativity: degree of embeddedness

One of the first questions or issues that need to be discussed by actors relates to what is creativity and how different people see themselves and their roles as creative actors in the process. It is important that all who are engaged in creating a culture of creativity view themselves as creative actors and see their role as significant in this regard. Indeed, Collard (2014) acknowledges the importance of people's self-reflection in this process.

It is also important to recognise that there are 'degrees' of creativity. The enhancement of creativity in the curriculum is a layered process; creativity can become embedded to the extent that it forms the entire teaching and learning strategy and mission statement of a school. This could be referred to as deep creativity. In other situations, creativity can be enhanced in the curriculum but it may be 'weaker'; some teachers may choose to employ more or less creative learning tools, depending on their individual skill levels, confidence and the subject matter they teach. Decisions about whether to embed creativity in the school's ethos or effect lower levels of creativity is contingent on a number of different factors, which might include funding pressures, pressures from parents and the attitudes of teachers.

The children also need to be recognised as 'hubs' of creativity and schools need to work with the needs and aptitudes of children to create a suitable creative environment.

Some forms of creativity can be interpreted by adults as highly engaging. However, children may be less enthusiastic towards them. It is important therefore that children's input is given precedence during the planning, implementation and evaluation stages.

Creativity: a challenge and opportunity

For teachers, artists, parents and scientists, enhancing creativity represents significant challenges. Some of the principal barriers that could adversely affect enshrining creative principles in the curriculum might include;

1. Overly prescriptive approach to the curriculum
2. Differences of opinion about how classes should be run
3. Disagreements about subject matter being taught
4. Dominant culture in school
5. Opinions of other staff members
6. Inadequate planning
7. Self esteem
8. Ambiguity around meaning of creativity
9. Physical environment of schools (layout of classroom for example)
10. Pressures to cover 'formal' curriculum

Clarifying some of these issues at the planning stages is important as they can adversely affect the implementation and embedding of the creativity ethos. However, as well as noting barriers, it is important to recognise the many factors that can also bolster creativity, given the right conditions. These include;

1. Supportive attitude of teaching staff
2. Willingness to change among teaching staff
3. Openness towards ideas of parents, artists, children and scientists
4. Physical environments of schools
5. Culture of schools conducive to creative practices

It is important that during the planning stages, teachers, artists and parents should identify these and work together to capitalise on the strengths of the group. Children should also have their say in determining what subject matter they would like to learn and how. We recommend that regular and clear communication at all stages is important and that passion for the idea and commitment to improving arts education overall, is extremely important.

It is also important for all actors to be honest about their feelings about creativity, how they conceptualise creativity and for teachers to think about and share knowledge with the artists and scientists about the strategies that may or may not work with different groups of children. Teachers have a deep knowledge of such issues already by interacting with the children in everyday life. However, talking to parents, artists and scientists about the benefits of creativity and creative engagement could significantly bolster this creative engagement. Participants should strive to create social and physical conditions where people feel supported to talk openly about their feelings about difficulties and issues that might be encountered during the process.

Some literature is available on how artists can improve creativity when engaging with young people and the significance of the physical environment to young people's

learning. Collard (2014) for example found that young people are highly sensitive to the mode of instruction which highlights that how information is conveyed by teachers, artists and scientists significantly affects the learning experiences of young people. It is important that all actors in the process take note of this and think about how their classroom design and method of instruction affects the creative engagement of children. It is important to remember that creativity is about engaging each child and some may be more receptive to particular teaching and instructional methods than others.

Creative strategies for artists

Collard (2014) provides a practical guide devised by artists themselves on how they can work creatively with children in the classroom. *The Artists in Creative Education project* (AICE) as documented by Collard (2014) aims to support artists in primary schools in socially disadvantaged areas. Collard (2014) states that the role of the artist educator is important as:

> *It is at the interface between creative and cultural learning that the artist-educator plays such a crucial role; enriching the classroom experience through sharing their expertise and skills.*

According to Collard (2014), the significance of incorporating arts into the curriculum relates to the awareness that artists themselves have about cultural identity and creative practices;

> *Part of the added value that we can bring to the table, as artists educators is having an awareness of how our own cultural identity, and our role within the prevailing hegemony, impacts on our own creative practice.*

Collard (2014) outlines some of the ways that artists might improve their own effectiveness when working with children. Some of the most significant points to note here include the importance of self-reflection and reflective practice for artists (p.11), thinking about the goals that they want to achieve working with children and young people (p.13), generating 'word clouds' to facilitate critical reflection on the meaning of creativity (p.13), and thinking about the meaning of creativity (p. 15).

Other more practical tips given by Collard (2014) relate to the following areas;

1. Building a partnership with schools
2. Building the relationships with schools
3. Thinking about the different art forms and what each can bring to different educational environments
4. Working together with teachers

Some of the questions that might be encountered around facilitating partnership with schools pertains to whether or not knowledge brokers should be used (i.e. a knowledgeable insider) when making initial pitches to schools about promoting arts programmes and instilling a culture of collaboration. At the initial stages at least, it is valuable for parents, teachers, artists and scientists to work together, thinking about the relationships with new participant schools. The strengths of individual group members should also be capitalised on. Some members of the group may for example, wish to

speak directly to parents and teachers about the benefits and issues that they observed in their own experiences in schools and the learning pay offs for children and adults.
Collard's (2014b) model of a creative learning project embodies a number of distinct yet interlinked stages. Collaboration and creativity are the keynotes of this approach throughout the 8 stages outlined below;

1. Planning
2. Doing
3. Reflecting
4. Reviewing
5. Refining
6. Doing
7. Reflecting
8. Evaluating

In this model, the processes of self-reflection and the need for continual review are evident. This gives participants a chance to think about what is or is not working best in individual contexts. This process of self-reflection is pivotal as is the process of group-reflection where participants come together to discuss how collaboration is working in practice. Evaluations should also be completed, at least after the programme in order to monitor progress and what is (not) working.

2.5 Conclusions and Recommendations

This chapter reviewed some of the major themes and topics that were focused on in previous BEAST! evaluations and focused attention on some of the principle concepts that linked the three BEAST! Studies - collaboration, creativity, engagement and participation. For the purposes of this evaluation, these concepts were examined as they signified the project. Moreover, it is important to scrutinise the meanings of these terms as how the BEAST! Model is incorporated into the ethos of schools depends on dialogue and debate about the meanings of these concepts.
Firstly, creativity was focused upon. This is a contested concept as there are multiple meanings of creativity. It is important for actors (scientists, teachers, artists and parents) to discuss the meaning of participation and some of the issues that can emerge throughout the process of instilling creativity in different subject areas (for example STEM areas). This requires a great deal of planning and dialogue and conscious self-reflection on the meanings of creativity and what it means to be 'creative'. The creative agency of all people involved in the process should be recognised and all participants including children should be accorded importance in determining creative tasks and thinking about creative challenges for young people that can work in the classroom and in other arenas (art galleries and art installations, theatres, cinemas, dance groups, etc.).
There are various levels of creativity, different ways of being participatory and fostering engagement. Participants in the process need to talk to one another throughout the process and also to elicit the expertise from other practitioners (teachers, scientists, artists) who have previously incorporated some participatory and/or creative strategies into their teaching. Reflecting on the meaning of their practices, things that worked well as well as things that could have been done better is an important part of learning and instilling a culture of creativity is most of all, a learning process that involves constant and continual reflection and (re)-configuring ideas about what constitutes creativity and creative engagement. Most of all, the participation of children

is an important component of this process and developing skills that enable their creative skills to be recognised and flourish.

Chapter Three: 'Capturing Creativity': Combining Qualitative and Quantitative Methods to study collaboration, creativity and young people's reactions to science and art

3.1 Designing and Implementing the Project Methodology

The researchers utilised a mixed-method approach when collecting, analysing and interpreting data for the BEAST! process study. Qualitative and quantitative methodological techniques were drawn upon to access children's social worlds and to tap into the experiences of multiple 'actors' in the BEAST! project (teachers, Baboró representatives, scientists, parents and artists). In this context, the combination of in-depth qualitative and quantitative data yielded significant insights about young people's reactions to science and art especially. The use of ethnography and in-depth interviews in particular, shed light on emerging collaboration and relationships between the children, teachers, scientists and artists which were important aspects of the project. Mixed-method research techniques frequently yield highly comprehensive datasets (Bryman 2012) and in this context, applying a combinatory approach generated in-depth materials on people's discourses about creativity, science and the arts and their opinions about BEAST!

The objectives of the Process Study were as follows;

- To design the project methodology including to design and/or source quantitative and qualitative tools to collect data.
- To describe, and critically analyse, different aspects of the project model
- Establish the perspectives of different actors involved in the BEAST! project (artists, parents, scientists, teachers and children).
- To observe workshops and document behavioural and attitudinal changes to evaluate the impact of the project.
- To write a process study report offering critical thoughts on the process and possible future developments for the BEAST! project

A combinatory approach which married together qualitative and quantitative methods was deemed to be appropriate for the BEAST! study in the context of the objectives outlined above.

3.2. Description of Schools who took part in BEAST! Process Study

Representatives from Baboró chose the three schools taking part in the BEAST! process study. These schools are Scoíl Cuimín agus Chaitriona, Uachtar Árd, Scoíl Inse Guaire Gort and Galway Educate Together National School (GETNS) located in Newcastle, Galway City. Baboró decided to include these schools because they wished to include urban and rurally-based schools and because of the amount of interest that was expressed by teachers and parents in these schools since the first BEAST! project was rolled out in 2012. It was also felt that the science and art projects worked especially well in these schools in 2012 and 2013 and that the children benefitted greatly from the projects in these settings. Baboró wanted to compile data about the culture of these three schools specifically to encourage reflection and discourse about why BEAST! was implemented so successfully in these settings. Compiling this data could yield further

questions about how and why the culture surrounding teaching and learning in these arenas were geared towards creativity. An important element of all this was the learning for other schools and how cultural change might occur to instil creativity and collaboration in the curriculum. In all, 69 children participated in the BEAST! project in 2014.

3.2.3 Overview of Research Aims, Questions and Methods

The following table (Figure 3) provides a summation of the main aims of the BEAST! process study, the research questions relating to these aims, and the methodological tools that were adopted throughout the project.

Figure 3: Summary of BEAST! process study aims, research questions and methodological approaches utilised

Aim	Research questions	Methods
Describe and Analyse the Baboró BEAST! Project Model	●What does the BEAST! Project Model consist of? ●What are its aims and objectives and desired outcomes? ●Why was it established? ●What are the structures and practices of the programme? ●How many schools/young people involved? ●What is the key research evidence on using arts in the science/technology curriculum?	●Review of programme reports & other relevant documents ●Interviews with Baboró Art Director/ Project Co-ordinator Focus group with Baboró Management Staff ●Documentary review ●Literature review
Establish the perspective of participants / key stakeholders regarding the programme	●Why did stakeholders choose to engage with the programme? ●What outcomes are perceived to result from the programme for young people, teachers, practitioners, parents? ●What are the views of stakeholders regarding the programme implementation?	●Interviews and Focus Group with Baboró Director/Manager/BEAST! Co-ordinator ●Administration of Quantitative data collection instrument to children in two participating schools ●Observation of workshops in each of the case study schools and at field trips to. ●Interviews with teachers, Scientists/Technologists, Artists ●Focus Group with young people in each school • Survey of parents
Document Attitudinal and Behavioural Changes towards Science and Art	● What are the opinions of key stakeholders in BEAST! project towards science and art ● What can be concluded at end of project about behavioural change as a result of BEAST!?	●Quantitative Survey questionnaire (Baseline study) ● Interviews and participant observation ●Quantitative survey questionnaire (Baseline study) of young people

		●Quantitative survey questionnaire (repeat of baseline study conducted in Week 1 of 2012) ● Interviews and Participant Observation
Reach a series of conclusions regarding the BEAST! pilot project	●What is the core purpose of the project? ●What outcomes are perceived to result from the programme for children, teachers and practitioners? ●What are the views of stakeholders regarding programme implementation? ●What recommendations can be made to guide the future development of the BEAST! project?	●Interviews with Baboró Artistic Director/Project Co-ordinator ●Focus group with Baboró Management Staff ●Analysis of findings from Quantitative data collection instrument ●Review of all primary and secondary data Process study review

3.2.3 Collecting Data Using Standardised Measurement Tools

In Phase I of the BEAST! study, the social researchers developed an instrument to gauge children's attitudes to the BEAST project, science and art, their feelings about school, their friends and resilience and wellbeing. This survey which was an amalgamation of existing standardised measures was repeated with children during Phase II of the BEAST! in 2013. This quantitative instrument was partly developed from research that was previously completed by the Child and Family Research Centre, NUI Galway (CFRC) (See Appendix 1)

Larsson *et al's* (2009) items on children's feelings of eco-affinity and eco- awareness were also incorporated into the instrument for Phase II. As the scientific projects implemented in schools were focused on children's interpretations of a 'sustainable future', the instrument looked at how young people react to the environment. It was also envisaged that at the end of the project, researchers would be able to make some suggestions about children's environmental behaviours and attitudinal changes which may take place as a result of the BEAST! study.

The questionnaire was divided into five discrete sections. Children were asked about their experiences in school; whether they feel like they belong in school and if they felt 'connected' to their teachers and/or other pupils. The survey also looked at how the children feel about themselves included items such as 'I feel good about myself', 'I feel worried' and 'I feel valuable'. The fourth section asked about the children's feelings towards their friends, while section five focused on their attitudes towards nature. The researchers administered the survey with the children during the first workshop with the scientist and repeated it again during the final session in order to chart any changes that might have taken place in behaviours and attitudes during the project. The number of children who took part in the survey questionnaire in both schools is summarised in the Table 4 below.

Table 4: Number of participants from whom Pre and Post Intervention Data were collected from, using Standardised Questionnaires

	GETNS	Scoíl Inse Guaire, Gort	Scoíl Cuimín agus Chaitriona Oughterard
Pre-Intervention questionnaire	**26**	**20**	**21**
Post-Intervention questionnaire	**26**	**14**	**20**

3.2.5 Using Focus Groups, Interviews and Ethnography to Access Children's Reactions to Science and Art

Participant Observation
Phase III of the study focused on the qualitative part of the project. The researchers completed ethnographic research (Participant Observation) at three workshops in each of the schools. The observation schedule was adapted from Ballantyne (2005[6]). This observational schedule was also used during the first BEAST! process study in 2012 and the subsequent adoption of the Ballantyne (2005) observational schedule in Phases I, II and III ensured that there was continuity in the research approach throughout the study

The group from GETNS also attended a trip to the sea along the shoreline of Galway Bay with two scientists affiliated with the Ryan Institute in NUIG and also a visit to the Galway Atlantaquarium. This was consistent with fieldtrips organised for schools in Phases I and II which took place at the Ryan Institute in Carna, Co Galway. In addition other field trips were to TG4 Television studios; Telegael cartoon production; An Taibhdhearc Theatre and Branar Puppet Theatre workshop. One of the researchers attended all field trips, recording extensive field notes about children's behaviours and their learning. Participant Observation is extremely advantageous as the researchers were able to directly ask the children about their feelings about different elements of the BEAST! project and to chart the level of engagement of young people in the fieldtrip element of the study.

Qualitative Interviews
This ethnographic research was also completed in tandem with qualitative interviews which yielded exceptionally rich data on how young people (re)-construct social meanings in groups (see also for example, Waterton and Wynne 1999; Macnaghten 2004 who argue for the focus group method in social research). The artists, scientists and teachers in the three schools were also interviewed using an interview guide and in-depth interviewing techniques. The interviews were carried out face to face and over the phone. The children from all three participant schools took part in focus groups and

[6] Ballantyne, R; J. Packer and M. Everett (2005) 'Measuring Environmental Education Program Impacts and Learning in the Field: Using an Action Research Cycle to Develop a Tool for Use with Young Students' *Australian Journal of Environmental Education,* vol. 21: 23-37

were very forthcoming with their individual and group reactions to the project.

Figure 5: Participants interviewed as part of BEAST! 2014 process study;

Participant's role in BEAST project	Number of participants interviewed
Artists	5
Scientists	5
Baboró representatives	3
Teachers	3
School Principals	3
Funders/Stakeholders	2

3.2.6 Survey of Parents

The parents were asked to complete a survey questionnaire which was distributed through the schools towards the end of the project timescale in May/June 2014. (Ref. Appendix 2). The questionnaire asked parents to describe the ways in which the participating children talked about BEAST!; how children felt about the project; any changes observed by the parent in relation to behaviour, nature or the environment or attitudes towards science subjects and the parent's thoughts and recommendations for project improvement. Utilising this approach meant that the researchers were able to compile some information on possible behavioural changes that parents discerned in children during the study. The findings from this survey are detailed in chapter five.

School Name	Number of Survey Forms Returned
Scoíl Cuimín agus Chaitriona, Oughterard	17
GETNS, Newcastle, Galway	11
Scoíl Inse Guaire, Gort	7
Total Forms Returned	**35**
Response Rate	**51% (35 forms returned out of 69)**

3.3 Qualitative and Quantitative Data Analysis

The interviews and ethnographic research was analysed using Discourse Analysis (DA). This is a highly versatile method of analysis as it can be used to analyse texts and photographs as well as talk (see Bryman 2012: 528). The researchers completed a close reading of the field notes and interview transcripts and extracted themes from these texts. Utilising Discourse Analysis (DA) was useful as it enabled the researchers to appreciate how different stakeholders in the project negotiated different understandings about science, art and creativity. Authors such as Alldred and Burman (2005) also state that the DA approach is important for researching children. They advocate an approach to research where precedence is given to the voice of the child and where they are listened to throughout the research process. The quantitative surveys were analysed using the statistical package SPSS which is very widely used in the social sciences.

3.4 Ethical Issues

Ethical issues were also given the highest primacy during the project. A literature search on ethical issues that impact on research with children was conducted during BEAST! Phase I and Phase II and the researchers adopted a 'child-centred' approach to the process of data collection. Parents received details on the project at the start and signed a consent form for their child to take part and a separate consent form for their child to take part in the research. All parents consented to their child's participation and all but one parent consented to their child taking part in the research. This child was not included in the research elements of the project. A consent document was prepared which the children signed before taking part in the interviews and this contained pictures which the children could relate to. All of the researchers were vetted by Gardaí before completing the study.

3.5 Conclusion

This chapter outlined the mixed-method approach that was utilised during this study. Combining qualitative and quantitative methods enabled the researchers to create a much fuller picture of the reactions of children and other stakeholders (teachers, scientists, artists, parents, funders) towards the project. The qualitative and ethnographic research strategies yielded in-depth data on opinions about the project and the children's behaviours. However, the quantitative survey questionnaire enabled the researchers to tap into children's feelings of resilience, wellbeing, social support and their reactions to nature. The survey with parents facilitated an exploration of the impact of the project on the children observed in the home by parents. The compilation of detailed ethnographic field notes throughout the study yielded exceptionally rich data on children's lived realities and their opinions about the project; what they felt worked well, and what they felt could be improved. The authors were interested in finding out the opinions of all project 'stakeholders' about aspects of the project that were engaging to young people and elements that could be changed from year to year. This information was viewed as extremely important for the development of BEAST! and for encouraging young people's creativity.

The utilisation of qualitative and quantitative methods in this context facilitated a rich dataset of children's knowledge of science, the environment and the arts. The next chapter of this report outlines the main findings from the three case-study schools and Chapter 5 details the overall findings from the research.

Chapter Four: Three Case Studies of Participating Schools.

4.1 Introduction

In this chapter, background details on the three participating schools are provided. This section presents critical data on how the BEAST! project was operationalised in each of the schools in 2014. This includes details on the content of the individual workshops that were delivered by the scientists, and artist; what they wanted to achieve throughout the project and the learning of the participants who took part in the project. This included the views of children, teachers, scientists, artists, and parents.

The first case study which is outlined relates to Scoíl Cuimín agus Caitríona, Uachtar Árd which is situated in a predominantly rural area north of Galway City, near the shores of Lough Corrib. The second case study documents the BEAST! model as it was implemented in Scoíl Inse Guaire, Gort and the third case study focuses on the implementation of the project in Galway Educate Together National School (GETNS), Newcastle, Galway City. There is an especial emphasis in this section on how each school embraced the BEAST! Project and how they carried the learning forward to create their own BEAST! Legacy.

Case Study 1. Scoíl Cuimín agus Chaitríona, Uachtar Árd

Background

Scoíl Cuimín agus Caitríona is located in the town of Uachtar Árd County Galway. It is a mixed school with boys and girls, ranging in age from four to twelve years. This is the third year that BEAST! has operated the project in the school and practitioners worked with the same group of children. This year, twenty two children took part in the project; they had graduated to forth class and were now aged between nine and ten years. The teachers, artist and scientist observed that the children were very enthusiastic and engaged with the project and showed good interest in each of the different workshops. The children reviewed their learning from the previous two year's BEAST! project work and demonstrated that they had absorbed and applied a great deal of the workshop information during the intervening period. The school moved to new premises in September 2013 and the design of this very modern school included many energy saving features which dovetailed well with the environmental objectives of the project and the science and technology topics that the children had learned in the previous two years. For this final year of the project the teacher with the science and arts practitioners identified that for the Legacy project the children could produce a video of the energy saving features of the school. They would design, script, direct and film the video themselves and be supported to do so by the practitioners and their class teacher.

The BEAST! Legacy

The BEAST! Legacy was the DVD film produced by the students on their new schools innovative water harvesting system and other energy saving systems. The production of this entailed building on the children's science knowledge, art skills and filmmaking skills that they needed in order to produce the film and the skills acquisition is described in the following.

What the Scientist wanted to achieve

The scientist, in continuing to engage with the same group of children wanted to develop further their exposure to the concept of science; to deepen their understanding of the scientific processes building on the learning from the previous two years. Specifically he wanted to bring science, technology and art together in a 'real' way so that they could use that learning in a practical way by producing the video themselves. He hoped that they would see and be able to calculate the environmental and energy impacts of the various energy saving processes contained in the new school design.

> *'I hoped that the children would be in the driving seat; the main drivers; seeking the information from me and on a journey exploring and empowering themselves... they were already very aware [but I wanted to] change their perception of their school, of their love of their school and for them to be more inquisitive about their environment.'*(Scientist 1)

There was an increased collaboration between the scientist, teacher and artist. In relation to the scientific element of the project, the teacher asked that the scientist would focus on addressing the current science curriculum that the students were working on and specifically the 'water cycle' and related aspects. Using the current school texts the scientist designed the workshops around the agreed criteria. The scientist delivered four workshops of 90-120 minutes each. He discussed his work as a computer scientist and his link with NUIG and with DERI (Digital Enterprise Research Institute). He further developed the concept of electricity creation and used videos to showcase how energy is generated and delivered through the national grid. In addition the scientist worked with the children on the water cycle relating this to identifying the energy and water saving capacity of the rain harvesting system and other energy saving systems used by the school. They became very familiar with the technology and workings of the systems and used the information in the script development for their video. The children brought tasks home to work on with their families and were able to discuss water usage of their households and identify where water could be saved. Parents engaged with children in the exercise and learned more about water conservation and also more about the project. This implies that the BEAST! project had significant learning outcomes for children and adults. In addition in this year as a result of the SCRATCH programming workshops delivered in year 2, the children were more IT literate and used their skills to upload their video, publicise the BEAST! project on Facebook and carry out research for their video and related school projects.

In summary the scientist said:

> *'In this third year the project matured [like] a well- oiled machine. A lot of lessons [from years one and two] were taken up and used. There was much more collaboration and reinforcing the curriculum they were studying [i.e. the water cycle] and we got the kids to use critical thinking to explore and solve problems...we wanted them to become more inquisitive'*(Scientist 1)

In relation to science as a subject two children said *'We learned lots of stuff.. we learned to save electricity, [about] plants and animals and I'd just love to do it again. Thank you for doing this for us.'*
'Make a big experiment with chemicals and nature. It was fun because we all got something to do.'
Some children felt that they had covered a lot about energy and electricity production and it was boring. They would have liked a new science topic in this third year.

> '*We were learning the same thing but in a new context'*
>
> *'I liked it better in the first year it was more exciting and new.. new concepts and stuff.'*
>
> *'In the first year we did loads of stuff – you invented your own invention and drew it out and it was so much fun.'*

What the Artist wanted to achieve
The artist delivered four 90-120 minute workshops to the group. The artists brief was to help the children to be inquisitive and to help them to integrate their ideas around their perception of the environment into the artistic expression in a film. Components of this included teaching film making skills, developing story boards[7], developing scripts and filming in various locations around the school and school grounds (including the systems in the attic). This was also done to facilitate critical thinking skills amongst the children and especially to think about their relationships with nature;

> *'I loved working with 10yr olds. The combination of things we did spoke to my heart.- caring about nature. It was a lovely way of engaging with children and the things I care deeply about. Children [demonstrated] active initiative and participation around how you think about something scientific or technical and turn this information into an engaging film. About how they express what they have learned artistically and creatively put [this] into action'* (Artist 1)

When asked about the art workshops, the children were enthusiastic in their responses. The enjoyed learning about all the elements in filming, in particular, how to use the movie camera and adopting roles in each of the filming teams. They realised the importance of all the aspects of movie making and the roles that each of them adopted within the filming teams. One child said – '*....how the smallest jobs are very important. The movie would be ruined if the light wasn't right and the sound person was very important*'
They surprised themselves at what they learned and were proud of their achievement in the production of the film.

> *'I think making the film [I] liked best. Posting it to the web and people can actually see the film and everyone can watch it and see how hard we worked to do it. Our work was worthwhile ....with the movie something to show for the 3 years work ..it pays off'*
> *I love BEAST! this year..my favourite part was the camera work and making the film. I enjoyed the movie making a small bit better than learning about the rainwater collection'*

[7] The children had learned about creating a story board with the artist in year two of the project

I like how we did art, filming, SCRATCH [programming in year 2 of the project], and learning how to save energy. The people were very nice and would help you whenever you ask and they would make it fun and it was a really fun way of learning'

The children had useful comments around improving the project such as ensuring that everyone in the filming teams got equal shares at using the equipment, and also that some children would have liked more time to practice their lines for the video commentary.

'..it would be better if we had more time and knew a bit more about our roles on the camera crew and [more practice of] our lines for the video'

Field Trips

In addition to the workshops the children were taken on two field trips. They visited the studios of TG4 in Inverin and Telegael in Spiddal; both venues in Connemara. They were very inquisitive in questioning the technology, how programmes are made and transmitted and the customer groups of these companies. They got a chance to sit in the editing studios and speak to the presenter of the children's programme Cula4 and see some programmes being recorded and edited.

Impacts of involvement for the teacher

n this third year of the project the teacher had defined ideas around what she wanted to see achieved for the students through BEAST! This included elements from the school curriculum that the children were currently studying including the 'water cycle'; wider environmental topics; speech and drama; story writing and using IT for research. She also saw that because there was great diversity in the project that it continued (as in BEAST! 2012 and BEAST! 2013) to allow children with special needs to participate on an equal footing. The teacher observed that the children further developed their teamwork skills, and this happened very organically. *'I saw good interest levels in the children and it was a great leveller for all the children especially disadvantaged children. Everyone was on a par and helped each other and compromised and the group work was excellent. (Teacher 1)*

She also observed that BEAST! has opened her eyes to the benefits of teaching science in this way and is already teaching more science to the class using active learning approaches that she has observed in the project. In addition the filming skills learned by the group will be useful in future filming projects she plans to work on with them in the future.

Benefits to the children of participation in the BEAST! III Project

Engagement and increased attention span

The project continued to engage the students' attention and the teaching methodology and exercises were specifically designed to this end. The practitioners and teacher noted that this continued to result in very good engagement, increased attention span and increased commitment to the project by the children.

Development of New Skills

In this final year the skills development included; science and technology interpretation, online research,; science on the water cycle and energy conservation; story boarding and script development; camera skills, presentation skills and camera crew skills; team building skills. These skills built on knowledge and skills acquired throughout the three years of the project and many opportunities were created to encourage the children to express them artistically in their chosen way. The children spoke about this feature of the project identifying that there was capacity within the project of doing things in new and more interesting and enjoyable ways;

> *'All through the 3 years there wasn't a unique way of doing everything and you could find a way of making it funn[i]er for yourself'*

This indicates that the project provided the conditions for the development of creativity in the children. In addition when children were asked their opinion on BEAST! they showed strong reflective ability in relation to reviewing the three years of the project.

Instilling such a wide range of skills in young people is important for improving academic outputs. However, these are also life skills which will be developed and nurtured throughout the life course.

Changes in attitude towards science

The teachers identified that the children had continued to talk of the BEAST! project since they participated in workshops in BEAST! I and II. Some children had talked of their enjoyment of the science workshops, the enjoyable style of delivery used by the scientist and of a career in science. This corroborates the findings of the previous process study reports which showed that knowledge and attitudes towards science were significantly enhanced through BEAST!

Teaching method - Cross curricular approaches

As in the two previous years of BEAST! the teacher identified the real benefits of teaching science and technology using a cross curricular approach. She plans to use this methodology in future teaching but points to some aspects that need attention if it is to be used by other teachers. The teacher saw that;

> *'[through this project] the teacher's role is not didactic. There is mutual respect. There is very much equality between the children and teacher. Sometimes there are inappropriate comments and they are pushing boundaries. The Department (of Education and Skills) should ensure that the video be shown at teacher training and teachers' summer courses'*

Collaboration

The teacher found that there was increased and beneficial collaboration with the scientist and artist and that Baboró had organised the project well. This teacher had been involved with the project for all of the three years and stated that she still felt that the role of the teacher is a little unclear and that she would have liked it made more explicit. She could see that with even more collaboration around the planning, she could have done more work on oral communication and drama with the students between sessions to prepare them. She would have liked to have seen the film take a wider focus on environmental issues, such as looking at the local riverine ecosystem and considers doing this with the class as a future project.

Observing the beneficial aspects of cross-curricular and cross disciplinary collaboration the teacher had new ideas on how she could use this in her future work. She talked of

involving the local community in environmental projects with the students and of having wider school collaboration on projects that could involve outside practitioners in a similar way to that adopted in BEAST!

Reflection

The scientist identified that the project had made him reflect deeply in relation to his work and its impacts for society and on how to make the concepts clearer for the children. This implies that BEAST! had significant learning 'pay offs' for other participants as well as the children, enabling scientific and arts practitioners to think about their own roles in creative pedagogies

'It reinforced things I learned in previous years making me reflect on the work I do and its impact for society and [puts me] in a reflective place. I was challenged to communicate with the younger child to give them a purer more succinct message. There were a lot of benefits [to me] from the teaching and creative point of view as I was exposed to the viewpoints and different perspectives of the children. It contextualises what I am doing and I see the meaning of my work. It's rewarding because we are developing techniques that will be used in their lives.' (Scientist 1)

Parents' views[8]

Parents identified that their children found the project to be '*great fun and very interesting*' Other comments from parents included; *'He was very excited about all of the project and loved talking about it at home' ,'understands science much more'* and is *'very pleased with the film on the water cycle and energy conservation'*

One parent said that their child *'Described the various [parts]of the project regularly and with enthusiasm'* and another was *'proud of the film and the way it came out.'* The majority of parents were pleased that they children got the opportunity to engage with the project. They said it was *'worthwhile', 'an excellent learning experience'* and *'a fun way to learn'*

They noticed some positive behavioural changes in their children in relation to attending school on BEAST! days; that they were *'more interested in science both at school and at home'* and '*more aware of energy [electricity and water] conservation.'*
Some parents felt that the project should be mainstreamed; *'the project should be integrated into all primary school classes.'*
Some other positive outcomes of the project included wider impacts '*More connected with Galway, the Uni and arts in the wider community*'
Parents would have liked more information and knowledge of the project on an ongoing basis.

Learning from the project experience in 2014

The learning from the experience of those involved with this school is the following:

- The young people deepened their engagement with science and showed a better understanding and retention of key science concepts and a positive attitude towards science.

[8] More detailed findings from the survey with parents is contained in chapter five.

- Children developed knowledge in science concepts that reinforced the science curriculum they were studying. They displayed improved skills in critical thinking and critical questioning.

- Children were very engaged and enthused and enjoyed the relaxed environment and teaching style during workshops.

- Teachers saw real benefits in this teaching methodology and are incorporating elements of creativity and cross curricular approaches into their own teaching styles.

- Scientists challenged themselves around incorporating creativity into their workshop design and delivery.

- The artist challenged herself around supporting the children to incorporate the science concepts into the film work in a creative way.

- Parents were involved through homework tasks and would like more information on BEAST! One parent said; *'my child has become more interested in the reasons 'why' behind all things from nature'*

- Collaboration was more extensive this year and worked to the advantage of BEAST! and the participants in terms of the very positive project achievements.

- The teacher would like to see the teacher role clarified and elaborated and feels that more can be achieved for the children if this were done.

Case Study 2. Scoíl Inse Guaire, Gort National School: 'Alternative energy sources and harvesting energy from people'.

Background

Scoíl Inse Guaire is a small three teacher school, located on the outskirts of Gort. The pupils are all male and the culture of the school is one where sport is very important and there are many opportunities to engage in sporting activities. The school population includes a significant proportion of pupils from newcomer families and there are language challenges for new pupils and for their teachers. The participating class included 17 boys who were in 5th and 6th Class and aged between ten and twelve years.

The BEAST! Legacy project

The collaborative discussions with the teacher, scientist and Baboró enabled a more cohesive planning of the Legacy project which was to work with the children in designing and building a puppet theatre to be powered by harvested energy. This project included the children building and decorating a puppet theatre, designing and creating a range of backdrops, writing a story and developing a script for a puppet production and producing the puppet characters. It also included identifying the science behind harvesting the energy that would power the appropriate light and sound devices.

What the Scientist wanted to achieve

The scientist delivered three 90 minute workshops to the class. She had worked with the same group of children in the first and second phases of BEAST! and had the aim of further developing the children's knowledge of science; in particular, their understanding of renewable energy and energy harvesting devices. In addition to build on the learning about energy harvesting so that they could use self-powered devices for lighting and sound to power a puppet theatre. The aim of this exercise was to encourage young people to think again about energy production and consumption and sustainability. In addition the scientist wanted the children to be more aware around their individual talents and that the academic world is '*open to them.'* The scientist also wanted to reinforce the teacher's positive attitude to maths and its practical application. She wanted the workshops to enable the children to realise that they can be good with whatever talents they have.

The scientist identified their own learning from participation in BEAST!;

> *'I really enjoyed seeing the kids reactions; some were really into it....I learned that in [order to explain what I did to kids] I needed to [see] that it is a different reality and to bring something different to their reality. It's positive to show them that scientists are not so different from them..they see university is not that far away'*
> *'The project also gave me a reason to experiment and I gained a better appreciation of the theatre and lighting'*(Scientist 2)

The children described their experience of the science workshops and there was evidence to suggest that the children incorporated the learning into their own life worlds;

'[I] really enjoyed the wiring and mechanical stuff'
'I wasn't a science fan before; now I'm a really big fan'
'Science wasn't interesting before'
[It is a] great subject the way [scientist] explained. Some of us might like to be a scientist or a teacher.'

'The way [scientist] learned us bit by bit about voltage and shaking things [harvesting human energy] to make electricity. [Scientist] is very good at explaining.'

'I thought it was good and I liked cutting things and actually doing things but I didn't like some of it ..I didn't like [the] listening and talking parts or the science stuff'

(Focus group 2)

What the Artists wanted to achieve

There were two artists involved with this school and they delivered a total of five 90-120 minute workshops to the group. One artist delivered two sessions on the dramatic use of puppets and the second artist delivered the workshops concerned with the puppet theatre construction, scenery design and construction and relevant aspects. The brief was to extrapolate the children's responses to the content that was delivered by the scientist. In addition the artists wanted to give the children an experience of theatre, drama and creative thinking. One artist (Artist 2) noted that the boys had a great willingness to perform and also to experiment. In addition he noted the boy's good natured teamwork and patience with each other especially around using tools to construct the puppet theatre.

The artist said that he experienced great learning from his participation with BEAST!;

'it was a very enjoyable experience they were a great bunch of kids...[it was] very experimental...with an awful lot of learning and I could see that children need these challenges....And to see the cross-disciplinary [approach] to learning in action. I learned that there is huge capacity in the kids ..more than I imagined ...and in how much they were capable of doing/understanding. I was taken aback by that..they took on complex problems....when you can pitch something at the right level to kids and they bite....at the beginning the kids test the water, a bit of slagging etc but the nature of the project, they wanted to explore and the attitude shifted then ..it was <u>their</u> project and they didn't feel judged; there wasn't challenge then or behaviour issues.' (Artist 2)

The children talked about their experience of the art workshops;

'How to talk, [use the voice to] make characters and that everything; a flower or a bottle can be a puppet' (Focus Group 2)

He learned us how to do the woodwork and use saws safely and he never got angry when we made a mistake – he held his temper. He told us what we did wrong and we learned from our mistakes' (Focus Group 2)

'I liked doing the woodwork and helping other people. This project is really good because no one feels left out and it's good because [two artists] try their hardest

to help others. The project would get better if we spent more days at it '(Focus Group 2)

Field Trips

The children were taken on visits to two venues. The first was to Branar Theatre's puppet workshop in Galway. Branar deliver theatre to children and utilise inventive puppets, set designs and backdrops. The children were shown how to use shadow and silhouette techniques and to design and make the backdrops and set. They got opportunities to use the intricate methods and tools demonstrated to them. [The group took this learning back to the classroom and some of them applied it in the construction of imaginative and meticulous sets and scenery] They asked many questions including how the manager started working with puppets and theatre, how much it costs to run the company and whether it was possible to make a living at this occupation.

The second visit was to An Taibhdhharc Theatre in Galway where the technical manager demonstrated the impacts of different lighting effects and sound effects on the stage. They gained a greater understanding of some of the basic techniques behind the production of theatre which would help in their own puppet theatre productions.
The Baboró Artistic Director demonstrated different dramatic methods on stage. The children fully engaged with the process, experimenting on stage with their improvised stories and ideas. The group of students demonstrated spontaneous engagement in an unrehearsed response; clearly enjoyed the process and were very positive in their comments in regard to both of the field trip visits. (Field observation notes May/June 2014)

Benefits to the children of participation in BEAST III project

Engagement, extended attention span

Good levels of pupil engagement were observed by the teacher, scientist and social scientist during the science and art workshops and on the field trips. The children observed that they wanted to be fully engaged in workshop activities and that the practical aspects appealed to them all.

Skill development

The teacher noted that the children learned more science concepts about energy renewal and also about storytelling, construction techniques and sound and lighting effects. She saw that the children absorbed the idea of their learning being self-powered.

'The science was hugely developed by [the scientist]. They learned writing [techniques] with [the artist in BEAST! II] and they got hands on experiences with concrete materials' [Teacher 2]

Changes in attitude towards science

The children noted that there were possible career options for themselves as either engineers/scientists; as teachers or as artists and it was possible to earn a living at these occupations.

'I wasn't a science fan before; now I'm a really big fan'
'Science wasn't interesting before'
(Focus group 2)

Children's behaviour and team working

The teacher noted that the group demonstrated much improved team building and collaboration. In this more informal style of teaching she felt initially that behaviour could deteriorate but she observed quite the reverse. She saw trust develop in the group accompanied by much improved collaborative skills.

Children's overall views on the project

The children were very positive about their involvement with the project. They enjoyed learning the new skills and enjoyed the teamwork:

> *'I liked doing woodwork and helping other people. This project is really good because everyone gets included and no one feels left out and the [artists] try their hardest to help others'* (Children's Research Instrument Gort)
>
> *'I really enjoyed the wiring and mechanical stuff'* (Children's Research Instrument Gort)

They said that the scientist was very good at explaining the concepts to them:

> *'It was a great subject they way [scientist] explained. Some of us might like to be a scientist or a teacher'* (Focus Group 2)

When asked to suggest ways that the project could be improved some children said that they were happy with everything about the project:

> *'I don't really think there is anything could be added to make it better. ...It was very well organised and put together and almost everybody that came in, I really liked. The activities were good fun and the information was interesting. There is no negative feedback I enjoyed all of it'* (Children's Research Instrument Gort)

Some children would have liked to complete the work making puppets.

> *I think it was perfect but you need to know more about puppets to make puppets but everything else was perfect'* (Children's Research Instrument Gort)

One child said that despite not liking drama or acting he was surprised that he liked the project more than he expected.

> *'I don't think it was for me 'cos I don't like drama and acting but I liked it a lot more than I thought I would'*(Children's Research Instrument Gort)

Parents' views

Parents were supportive of the project and said that their children reported back that they found the project *'fun and interesting', 'enjoyed it',* and *'felt part of the team'.* One parent said that their child showed more interest in science and would like to see more workshops. Overall parents felt that the project was a good experience for their child: *'I think it's fantastic for my son'*

Teaching method and Cross –Curricular approaches

The teacher identified that the workshops linked well together and created continuity in the learning. She built on the content of the workshops by working with the children in the intervals between workshops by using the creative writing approach [taught in BEAST! II) to finish their individual stories and to work on their drawings. The teacher observed the benefits of how the children's learning was supported by the linking of science and arts subjects such as drama. She observed that the needs of the pupils were identified and included in the collaborative planning of workshops. In her planning the teacher used the discretionary time for art and drama and music in the school curriculum and allocated this to the project. She plans to use the puppet theatre built by the group for oral language development. She observed the children were more engaged

this year as the workshops were very 'hands on' and there were more opportunities to engage in the practical aspects;

> *'The project worked better this year, the children were more engaged as it was very hands on for the boys. There were more aspects of the arts, more making and doing, puppetry and there was something for everyone.'* [Teacher 2]

Collaboration

The scientist was satisfied with the level of collaboration with the teacher and with artists and thought it was much improved from the previous years and with a better defined focus and good communication throughout. She found the teacher very supportive in reinforcing the science concepts; encouraging the students to experiment and drawing links with the children's current school work. In terms of drawing links between the science and arts components of the project, the scientist felt that the joint sessions with scientist, artist and teacher were critical in enabling the children to see the adults brainstorming together and with the children and to understand how the links between the different methodologies and activities developed in a tangible fashion. The artist felt that there could have been more collaboration and would have liked more time with the scientist in order to plan more effectively around the practical aspects. The teacher was very happy with the level of integration and collaboration and felt this was a strong feature of the BEAST! model.

Learning from the project experience

- The teachers, arts and science practitioners and children were all very happy to have been involved with the BEAST! III project and would like to see that involvement continue. *'I would do it all again in the morning.'* [Teacher 2]

- The legacy project was ambitious in terms of its objectives and needed more time in order to 'polish' the puppet theatre, make the puppets and complete the development of the storyline into the script. The amount of time needed in order to complete all the tasks was underestimated and the scientist and artists stated that in their planning they should have used a more realistic calculation of time requirements and a fully worked schedule to allow the project to complete within the timescale. This is often a feature of innovative projects and one that needs to be accommodated in future project planning. In this instance extra workshops were put in place to enable the class to complete the final elements.

- Teachers and scientist identified that the diverse approaches in the workshops allowed the children to experience many different art forms, techniques of making theatre and tools to experiment and 'play' with. This enabled the children to gravitate towards areas which were their strengths and talents.

- The workshops content was deliberately more interactive this year and worked well for the group in retaining and developing their participation.
- Children showed more interest in science *'I wasn't a science fan before now I'm a really big fan'*

- Team building was a strong feature of the work this year and all practitioners, teacher and social scientist commented on the ways that the group supported each other to engage and share in the activities.

- One artist described BEAST! as *'Brave, necessary, exciting; providing different strands and ways of learning*' [Artist 2]

Case Study 3: Human-Environment Relations and Interconnectedness: Exploring the Importance of Seaweed and Marine Life in Sustainable Development and the Creation of Green Technologies

Background

Galway Educate Together National School (GETNS) is a multidenominational mixed-primary school situated in Newcastle, a suburb of Galway City. The children are aged from four to twelve years and the children who participated in BEAST! were aged between eleven and twelve years. The principles of inclusiveness and parental participation lie at the heart of the school's ethos which is summed up in the phrase 'learn together and live together'. This year's BEAST! project as it was rolled out in the school, built on the learning from the previous years and focused on the interconnectedness of marine life off the coast of Co. Galway. However, it also emphasised the interdependent webs that exist among marine species internationally and what this means for sustainable development and children's lives in the West of Ireland.

The BEAST! Legacy project

The legacy project was worked out in a collaborative and creative exercise that included the children as well as the artist, scientist, teacher and Baboró staff member. This culminated in the design of the legacy which had two components. The first element was to create an aquarium that would be populated with salt water marine life that was native to the West Coast of Ireland. The second element was for the class group to design appropriate peer teaching sessions with accompanying teaching materials which they would use to teach younger classes about marine life that populated the aquarium and also some concepts around the interconnectedness of marine life. The lesson plans and materials would be retained by the school as teaching aids for future sixth class groups to use for peer teaching.

What the Scientists wanted to achieve

The scientists delivered four 90 minute sessions. They viewed that they were progressing the work from the previous year with the objective of deepening the children's appreciation of science and their knowledge of marine life around the Galway coast. The main aim was for the children to have an awareness of their responsibility for the environment. They collaborated with the teacher to link with what the children had already covered in the school curriculum and the teacher was able to help to draw out the learning for the children with relevant concepts both during and between workshop sessions. The scientists were impressed with some of the children's level of knowledge on the environment. They displayed a high conceptual knowledge about the world around them and their science education up to that point clearly helped them to digest the concepts in a much fuller way. They learned how contamination travels through all the tropic levels to eventually pass to humans and were able to see the interconnectedness of the environment. They learned about marine plastic pollution and made 'monsters' and boats out of waste plastic. They also discussed the impact of

invasive species such as Zebra Mussels and the positive and negative aspects of having a school aquarium.

There were opportunities to actively work with seaweed when the group made edible sushi from seaweed, rice and vegetables; and when they used seaweed in an experiment to make blue 'caviar'. The children displayed very good levels of engagement during the science workshops. [Field observation notes May/June 2014]

One scientist felt very positive about the experience. She learned a lot and enjoyed communicating science at a different level for the children;

> *'I learned that in [order to explain what I did to kids] I needed to [see] that it is a different reality and to bring something different to their[the children's] reality. Its positive to show them that scientists are not so different from them..they see university is not that far away.. and I learned [that] any fantastic idea, crazy idea, you can do it and have fun to a fantastic level. With kids everything is possible'*
> [Scientist 3]

As in the previous BEAST! workshops, the children demonstrated high levels of engagement throughout and they were exceptionally enthusiastic about the sessions. As one child said;

> '*I felt that it was fun and we got to do fun activities'* [Children's Research Instrument GETNS]

Field trips

The children visited a beach near Galway. Here they met with the scientists who asked them to think about the surrounding environment and the types of seaweed which were all around them. They collected a range of seaweeds and identified the different varieties correctly and learned about some of their uses.

They also visited the Galway Atlantiquarium and saw many of the species that were to populate their school aquarium. They were encouraged to interact with some of the specimens in the tanks and enjoyed stroking the Rays that swam over to them. They were given privileged access to the filtration centre and were shown the similarity to systems that would be used in the school aquarium. They asked many questions and the guide was surprised with the group's level of knowledge. When he stated that the octopus has no bones, two children corrected him saying 'except the beak.' Children brought their experiences at this field trip to the next science workshop and discussed their experience with the scientists. [Field Observation notes April/May 2014]

What the Artist wanted to achieve

In this final year of the project the artist's brief was to help the children to link with the science relating to the new school aquarium and develop their peer teaching lesson plans and materials. The artist was supported by the teacher and Baboró staff member in the delivery of the workshops and the children wrote stories and produced hand illustrated story booklets to use in their lessons with younger classes. Examples included 'The Travels of Jeremy the Blenny Fish' and 'Sandy and Stella the Starfish at the Rock Pool' (See appendix 3) All the stories contained relevant information about the species life cycle and can be used as a resource to teach classes in the wider school. In

addition the children designed and produced games as other resources to explain the interconnectedness of the marine world and the impact of pollution.

During these workshops, children often worked in groups to design the different lesson materials and they produced some attractive and original work. One child said;

> *'I really enjoyed making my story and everyone was proud of me'* [Research Instrument GETNS]

In addition they produced a video scripted and produced by themselves on 'How to be a Debating Extraordinaire' (See appendix 4)

The peer teaching sessions were delivered to 3 classes in the wider school. These were to Senior Infants, 2nd Class and 4th Class. They were designed to link with the science curriculum that each class was currently studying. The most successful sessions were those with Senior Infants and 2nd Class. The lesson to Senior Infants included the BEAST! participants reading their stories to groups of infants and then engaging in interactive question and answer and talking partner's activities with them. They displayed good knowledge and encouraged the infants to engage in discussion.
The peer teaching session with 2nd Class was also viewed by the class teacher and pupils as very successful. It included interactive elements and drama where children of all abilities were encouraged to take part. The teachers of these classes viewed that the BEAST! participants were good mentors and role models for the junior students and performed the peer teaching very well.

At the same time however, some of the children designing lessons for the 4th class found this stage of the project to be more challenging. The peer teaching objectives for the 4th class became too complex and ambitious for them to achieve in the timescale. They were not comfortable with presenting to a class without considerable rehearsing and the preparation of the associated teaching resources was too challenging for them to achieve in the time available. The artist assumed responsibility for producing some of the resources for these lessons and the children in this group reported zoning out of these sessions. This impacted on their ownership of the project which was very high at the start but waned towards the end. One of the children said;

> *'I was kinda getting bored; we were just watching [artist] not really participating with [them].* [Children's Research Instrument GETNS]

On reflection the artist realised that this had happened;

> *'I needed to allow more time for flexibility; for admitting something isn't working and change'* [Artist 4]

This showed in a very concrete way the impact of the positive effects of BEAST! Where the project was responding to the children's identified needs and where they were involved in the decision making around the project objectives, children were fully engaged and had a strong sense of ownership. When the work became too demanding and they became observers rather than participants, they retreated from engagement. This can be seen as a tangible example of an approach that did not work effectively. There is considerable learning around the importance of constantly checking with the children that they are involved and that their needs are being met. Their level of engagement and curiosity is a good guide as to whether this is the case. It is also a

demonstration of the importance of taking time to explore why something is not successful and learning from this.

Nonetheless the peer teaching to Senior Infants and 2nd Class was viewed by the class teachers and the students in these classes as very successful and well planned. The level of teaching was pitched at the correct level and the pupils were engaged throughout. Both the class teachers thought it was an excellent exercise for their pupils and would recommend that it be repeated as the resources produced by the BEAST! participants encouraged creativity and were suitable for different ability levels.
The children viewed that they enjoyed the project and got a lot from it. It was challenging to present to other classes and sometimes they were nervous.

> '*It takes a lot of work to complete a BEAST! project. When I am presenting something I'm really nervous and scared; but it's fun'* [Children's Research Instrument GETNS)

Views of the Teacher
The teacher viewed that the project worked very well again this year. He also felt good about the relationship with Baboró and with NUIG and could see how that developing relationship built on the work each year. He identified that it is important to 'take time to go through all the steps' in the collaboration and planning process in order to reach a realistic set of objectives and that it is *'vital that the teacher is implicitly involved using their philosophy and teaching skills to support the practitioners The group meetings and collaboration made me feel very much involved and part of the drive and the direction and [increased] my level of commitment'* (Teacher 3)

Because this was the third year of the project and the children were very comfortable with and understood the BEAST! process; *'They got it this year'*; the teacher and practitioners felt that the class were more capable. The children were challenged more this year and were exposed to many opportunities for creativity.
He felt that he had a *'heightened joy and great sense of pride'* in what had been achieved by the children, that they had *'really completed something really amazing.'*
The teacher also felt that he had learned more about managing group work.

Parents' views[9]
Parents were in the main very positive and supportive of the project. They noted that the children reported their enjoyment of BEAST! and displayed increased knowledge about the marine environment. *'Her knowledge of seaweeds is impressive'*; *'He has become more interested in understanding the reasons "Why" behind all the things from nature'*

Parents noted some changes in their child's behaviour relating to the environment; *'more care about nature, talking a lot about the environment and watching TV programmes related to the environment'*; *'She always picks up rubbish now.'*

One parent noticed several changes in their child;

> *'[They] are more interested in science and enjoy experiments and group work. She*

[9] Findings from the survey with parents.

wants to participate more in [science related projects] and has improved her communication skills and has more confidence in sharing her ideas.'

One parent could not separate out the impact of the project from other experiences that their child was engaging with; '*My child is changing all the time. I don't know what is down to one project or one influence'*
Two parents would have liked more information about BEAST! and suggested;

'I think if there were updates given in written form as to what the child did in relation to BEAST!'

Benefits to the children of participation in the BEAST! Project
Engagement and increased attention span
Engagement was generally high throughout the project timescale with the exception of the later few art workshops for some of the children. (Detailed above) This strong engagement was observed by the children themselves, by the teacher, practitioners and the social scientist. The young people were engaged with the concepts and ideas in the science and artistic workshops and exposure to these sessions continued to enhance their appreciation of the arts and sciences and what they contribute together

Development of New Skills
The children achieved a very high level of work in their engagement with BEAST! Their teacher felt that he had a 'heightened joy and great sense of pride' in what had been achieved by the children, that they had 'really completed something really amazing.'
The children learned new skills including using their story writing and illustration to create a booklet, designing teaching resources to support lessons, peer teaching techniques, debating techniques and filming/video production. They learned about maintaining a school aquarium and the ways that the marine environment is interlinked in a 'web of life' The students displayed high levels of collaboration in their group work.

Changes in attitude towards science
Similar to the findings from the previous year's BEAST! projects the teacher identified that the children talked about the project in the classroom between workshops and that they enjoyed BEAST! However, he also said that many of the children have a high level of scientific knowledge themselves which is fostered in the school and at home and that they are enthusiastic about the discipline. Parents noted increased interest in science, the environment and in asking questions about nature in a more reflective way as a result of their child's involvement with the project.

Learning from the project experience
The learning from the experience of those involved in this school is the following: -

Teaching method - Cross curricular approaches
The GETNS teacher felt that creativity and the bringing together of science and art is an important teaching tool for working with young people. He commented that the teaching methodology really helped the development of creativity in the children.
He identified the impact of working in a more creative way with pupils as:

'Having that open mind and heart that can see all the possibilities and not see the pride and ego that closes down the doors to possibility. The potential of "playing together" allows spontaneity.' [Teacher 3]

The teacher also talked about the role of creativity in teacher education and said that key to this was allowing creativity to surface by starting with the child;

> '*You need to start with the child. The creative self needs to be encouraged and allowed to fail. Give teachers access to more creative opportunities within schools; for example drama.'* [Teacher 3]

The interactive style adopted by the scientists greatly enhanced the children's learning and their enjoyment of the subject. The scientists worked hard to interact with the children by introducing concepts in interesting ways using videos, slide shows, experiments, games and challenging activities. Similarly the artist included many different activities to stimulate the children's engagement.

Collaboration between practitioners, Baboró and teachers

Overall, the GETNS teacher felt that the project coordination was good and that the project was well organised. Specifically he mentioned the initial brainstorming exercises facilitated by the Baboró Artistic Director with the children, teacher and practitioners that helped to identify the legacy project and resulted in the children having more focus and ownership. 'They owned the project.' He valued the collaboration with the scientist and artist around the workshop design and it enabled him to draw links for the children between sessions to deepen the learning. The teacher viewed that he learned the importance of the organic process and to take time to plan the necessary meetings and dialogue with practitioners

Some children felt that they had spent too long on the marine environment as it had been the focus for the three years of the project.

> *'I liked BEAST! this year. I think the information we have learned this year will help me in the future. One thing I didn't like was that we kept going over the information we had learned again and again. Other than that I really enjoyed BEAST!'* [Children's Research Instrument GETNS]

This finding was replicated in the other schools and suggests that for some children there should be a new topic of scientific focus for each year of the project.

There was widespread support from teachers in the wider school who were pleased and surprised at the standard of work produced by the BEAST! participants and saw real benefits of this teaching methodology.

The school now owns tangible artefacts as a result of their participation in BEAST! They own a large aquarium populated with native Irish marine species and a large and impressive set of teaching materials produced by the children and artist that will support and stimulate lessons on science, the environment and related topics for years to come. (See appendix 4)

The teacher pointed to the importance of the process research study in documenting the project processes, supported by the videos and photography. It is 'powerful and respectful of the work done.'

The findings described in these preceding three case studies are collated with the findings from the quantitative instrument and other data in the following chapter to achieve an overall view of the project's learning and achievements.

Chapter Five: Research Findings

5.1 Introduction

This section describes the results of the qualitative, quantitative and ethnographic data which was collected by the social researchers in the schools in Uachtar Árd, Gort, and Newcastle, Galway City. It includes the interviews that took place with children, teachers, principals, artists, scientists, funding stakeholders and members of Baboró. In addition it includes the findings of the survey of parents. The research produced findings on issues such as the children's level of engagement and their changing views about science. It also produced findings relating to the key issues that were being investigated and some of the core themes which were revealed through ethnographic and qualitative research. The interview questions (see appendices) contained questions about the BEAST! model, the teaching methodology and participant's views on collaboration, reflection and creativity that emerged during the study. This section goes into some detail regarding the findings which will also be considered in the discussion and recommendations sections of Chapter six.

5.2 Perceptions of stakeholders about children's participation in BEAST!

Participant children were very enthusiastic about their involvement with the project:

> *I like the BEAST! project very much because I felt like everyone was included and that I had a lot of fun'* (Children's Research Instrument GETNS)
>
> *'I think it is perfect the way it is and it is joyful'* (Children's Research Instrument Uachtar Árd)
>
> *'I think it would be better if we had more time to work on the project but overall it was fun to learn about lots of new things and I had a great time'* (Children's Research Instrument Uachtar Árd)

Teachers, practitioners and social scientists noted that during workshops the children enjoyed the relaxed environment and style of teaching, displayed longer attention spans and surprised them with what they achieved. Teachers all also noted that after the project children were still remembering and talking about their engagement positively and teachers were continuing to draw out the learning from the workshops. Parents also were very positive in relation to their children's enthusiasm and engagement with the project over the three year timescale.

5.2.1 Changes in the Children's attitudes towards Science

During the workshops pupils made statements recognising that there were possible career options for them in science/technology or art and they asked practitioners about the practicalities of working in their chosen speciality and whether it was possible to earn a living in these occupations. (Field observation notes. May/June 2014). This is a highly important observation and implies that BEAST! achieved its aims in this regard. Furthermore, previous BEAST! process studies also imply that the project helped to change attitudes towards science which corroborates this finding.

The children were very capable and asked thoughtful questions. They liked it best when they got to do experiments, examine devices and work in groups together:

> *'I wasn't a science fan before; now I'm a really big fan'*

'Science wasn't interesting before'

(Focus group 2)

Some children felt that they had covered a lot about particular science topics and it was boring. They would have liked a new science topic in this third year of the project:

'*We were learning the same thing but in a new context'* (Focus Group 3)
'I liked it better in the first year it was more exciting and new..new concepts and stuff' (Focus Group 1)
'I thought it was good and I liked cutting things and actually doing things but I didn't like some of it ..I didn't like [the] listening and talking parts or the science stuff' (Children's Research Instrument Gort)

5.2.2 New skills development in the participating children

Teachers and science and art practitioners identified that the children displayed good critical thinking and critical questioning skills. In addition the social researchers noted that the children displayed good levels of reflective ability compared to year one of the project;

> *'He learned us how to do the woodwork and use saws safely and he never got angry when we made a mistake – he held his temper. He told us what we did wrong and we learned from our mistakes'* (Focus Group 2)

> *'All through the 3 years there wasn't a unique way of doing everything and you could find a way of making it funner for yourself.* (Focus Group 2)

Teachers, practitioners and social scientists noticed increased collaboration and teamwork skills in children across the three schools and teachers saw that the methodology was equally effective for children with disabilities.

In the different schools the children were taught different sets of skills which depended on their legacy project and their own needs.

5.3. Parental perception of their children's participation in the project

As described in Chapter three, a survey was circulated to parents of the participating children in the three schools. Out of 67 forms distributed; 36 were returned, with a response rate of 53.7%.

5.3.1 Parent's awareness of the project

All parents were aware of the project and noted that they knew that the project involved science topics and experiments and art and excursions. Parents of children attending the three schools were aware of the specific activities that school engaged in and they mentioned: helping the environment; the sea; filming work; a puppet theatre; outings and trips; that it was about helping other classes with activities.

5.3.2 The ways in which children described the project to parents

One parent said that their child spoke proudly of the project.
Parents also noted that their children spoke about the project with enthusiasm and described it as: *'fun' 'exciting', 'she felt it was a great help to her' 'would love to do it again'*

Parents reported that their child felt; *'happy'* and *'excited and enthusiastic about working on the BEAST! project'*
Generally parents reported that the children enjoyed the topics and the field trips and that the project practitioners were '*very nice, [they] were fabulous'*

5.3.3 Changes in Children's behaviour

Two thirds of parents noticed changes in their child's behaviour that they ascribed to their participation with the project. These included:

- Greater interest in science; talking about science and the environment and doing science at home with family members
- Greater understanding of science '*Understands science much more', 'Her knowledge of seaweeds was impressive'*
- More awareness of energy usage: *'She keeps on about electricity'*
- Greater awareness about nature, waste and water. '*More care about nature, the environment and watching TV programmes related to the environment', '*
- Doing more art and school work at home: '*She has been doing more and science subjects at home and has lots more enthusiasm for a lot of school subjects'*
- Greater confidence in doing school work *'More confidence in doing school projects and enjoys them now'*
- Using the computer more competently for research and homework
- Easier to get child to school on *'BEAST! days'*
- Improved team work skills: *'More involved in teamwork but is still happy to work on her own too'*
- One parent noted that their child was thinking more critically: *'Has become more interested in the reasons "why" behind all things from nature'*
- One parent said their child had loved the poetry workshops [in BEAST! I] '*Loved the poetry of the sea session– she is very keen on poetry'*

One parent noted that their child had more connection with Galway, with the University and arts in the wider community.

One third of parents interviewed did not notice any changes in their child's behaviour that they could ascribe to the project. Parents could not separate out the impact of the project from other experiences that their child was engaging with: '*My child is changing all the time. I don't know what is down to one project or one influence'.* That said, some positive indications were given that BEAST! was having a positive impact on young people as evidenced in qualitative data outlined above.

5.3.4 Parents overall views on the BEAST! project

Nearly all parents (97%) were very positive about the project and expressed a range of positive opinions. These included that it was a worthwhile and excellent learning experience for their child; that their child really enjoyed their participation and was: *'lucky to have been involved', 'Fantastic opportunity', 'BEAST! has given the children an alternative way of learning', 'It was a fun and interesting way for kids to learn through a new medium'*

Another parent stated:

'I am thinking that [child] was lucky to be involved in the project. It was organised very well and the people were super. I found a big difference between the kids who were involved in the project and who were not. They were more competent and more caring about the environment and nature'

5.3.5 Parents' recommendations

In general parents would like the relationship with their school and Baboró to continue. One parent felt that the project was*: 'brilliant and should be integrated into all primary school classes'* another said: *'It should definitely operate again'*

Other suggestions included that parents should be given the option of more involvement and they would like more information about the project provided to them:

- *'An option for more parent involvement. It would be nice to know more in advance'*
- *'An outline of the project and excursions [could be] provided to parents so we can be a little more aware and then supportive of what they are doing'*
- *'You would be more aware and in line with what the children are talking about'*

5.4 Views of Teachers, Principals, Science and Arts practitioners regarding their own learning from participating in the project

The learning for teachers and practitioners has been extensive over the three years of the project and in this final year participants were very reflective on the impact and learning for them from their engagement with the project.

One teacher gained a lot from collaborating with the arts and science practitioner;

'*It's that experience of working with the scientist and artist and to get involved in the work and to get the dialogue going and play with the ideas' (Teacher 3)*

Scientists also identified that the project had made him reflect deeply in relation to his work and its impacts for society and on how to make the concepts clearer for the children. This is evident in the following quotation;

'It reinforced things I learned in previous years making me reflect on the work I do and its impact for society and [puts me] in a reflective place. It contextualises what I am doing and I see the meaning of my work. I was challenged to communicate with the younger child to give them a purer more succinct message. There were a lot of benefits [to me] from the teaching and creative point of view as I was exposed to the viewpoints and different perspectives of the children. It's rewarding because we are developing techniques [in them] that will be used in their lives.' (Scientist 1)

'The project was thoughtful, responsive, flexible and meaningful and it meant a lot to me to be in involved' (Artist 3)

Participating teachers spoke of the many benefits they had received from involvement with the project. The teachers discussed how they learned from observing the way that the Baboró staff, science and arts practitioners interacted with the children and were incorporating the learning into their teaching styles. One teacher spoke of the how much he appreciated what was achieved:

'I felt a strong commitment and heightened sense of joy and sense of pride that [the children] had really completed something' (Teacher 3)

'We all learned that kids learn things in different ways [we already knew this] but we saw it in action.' (Principal 1)

'*I learned about the theatre, set design. And I learned children are like sponges; some of them; if you give them opportunities all will gravitate to what interests them most. They had great imaginations; great stories'* (Scientist 2)

Participants have been stimulated by their involvement with BEAST! to move forward with their own ideas and developments. One teacher found that her interest in this teaching methodology was so enthused that she is now studying for an MA in Arts in Education. One school want to extend their relationship with NUIG and plan to approach the university with ideas for a joint in-school project. One group of participating scientists have found this outreach component of their work so beneficial that they have applied for EU funding to support their own outreach projects.

'Through BEAST! I have learned more about Outreach and now we have applied to the EU for funding for an Outreach project' [Scientist 3]

5.5 Views of Teachers, Principals, and Science and Arts practitioners regarding the BEAST! cross - curricular teaching method

As in the first two years of the project, there was widespread support among all stakeholders for the BEAST! teaching method. The teachers interviewed were very positive about the high levels of engagement of the children and the positive impacts on the children's lives. Importantly, the cross-curricular approach was seen as important because it integrated practical and scientific insights about science and the environment and engaged a wide range of actors in scientific learning (parents, artists, scientists, children, teachers). Parents also commented that they felt that their opinions were valued by scientists and teachers and many of them felt that the creative, cross-curricular approach to teaching opened up a space where their opinions were heard.

5.5.1 Impact of how children of all abilities learned and collaborated

Participants commented that the teaching approach allowed children to learn and display a wide variety of abilities and children with all levels of capability engaged with the activities. This was especially important for children who had learning difficulties and physical impairments. In the following quotation for example, one teacher says that BEAST! encouraged a spirit of equality of opportunity in the classroom;

'I saw good interest levels in the children and it was a great leveller for all the children especially disadvantaged children. Everyone was on a par and helped each other and compromised and the group work was excellent. (Teacher 1)

'Very experimental; very enjoyable to see the cross-discipline [method] in action' (Artist 2)

The science was hugely developed by [the scientist]. They learned writing

[techniques] with [the artist in BEAST! II] and they got hands on experiences with concrete materials [in BEAST! III]' (Teacher 2)

5.5.2 Impact on children's behaviour

Teachers and practitioners discussed how they were surprised at what the children could achieve when they were challenged by the project. One teacher noted the improved team working and collaboration of her class:

'*I saw big impacts on behaviour and huge trust. Behaviour could deteriorate in this situation but I saw the reverse and they learned team skills'* (Teacher 2)

'BEAST! III was exceptional this year; a lot was decided by the kids and they had more ownership' (Teacher 3)

5.5.3 Teacher's role

One teacher stressed that it is vital that the teacher is implicitly involved in the planning and execution of the project from the very beginning:

'The teacher is needed to bring their philosophy, teaching skills, [knowledge of the children] to support the practitioner and need to be involved in the drive and direction to increase their [and the children's] level of commitment' (Teacher 3)

Another teacher identified that in this methodology there are differences in the teacher's role:

'[through this project] the teacher's role is not didactic. There is mutual respect. There is very much equality between the children and teacher. Sometimes there are inappropriate comments and they are pushing boundaries. (Teacher 1)

The learning for teachers around their role in the classroom has shown them the importance of encouraging critical questioning. One teacher noted that they had learned that it is important to allow pauses, space and time for children to formulate their questions. An essential component in this is the welcoming and respect for children's questions and taking the time to respond to and reward questioning.

5.6 Views on the importance of creativity and how the project has demonstrated the use of art across the curriculum.

In this final year of the project all participant were challenged to be more creative and they responded to this call in very positive ways. Participants embodied their awareness of the importance of creativity and the opportunities to engage with the arts as a key feature of the project. They reflected on the impact of creativity in teaching:

'Having that open mind and heart that can see all the possibilities and not see the pride and ego that closes down the doors to possibility. The potential of "playing together" allows spontaneity' [Teacher 3]

'I think we are generally lacking in encouraging creative thinking. It gets left behind ... BEAST! shows so many different areas of creativity and this can be

dependent on different teachers. It needs to be prioritised and it is an important element in problem solving in maths' (Principal 3)

'It's a way of thinking isn't it? A way of looking at things. BEAST! helped opportunities to happen, yes, [skills] can be transferred, important skills to develop especially because of the different problems that people [children] have. [this helps the] overall development of the person. Everyone has a creative side' (Principal 1)

Scientists and arts practitioners said that the project challenged them to be more creative in their design of the workshops and to ensure that they were child-led. The science and arts practitioners also collaborated well and learned from each other in relation to how to connect the learning across the two disciplines. This often meant that they were improvising and learning in the moment. They found this both stimulating and enjoyable:

'I would like to be more flexible and have more confidence in allowing the children's needs and interests to drive the workshops' (Scientist 1)

Practitioners and teachers noted that it was important that everyone had the opportunity to experiment and to fail as part of the process of learning:

'*You need to start with the child. The creative self needs to be encouraged and allowed to fail. Give teachers access to more creative opportunities within schools; for example drama.'* [Teacher 3]

These findings point to the need for project objectives to be open-ended to allow for the flexibility required to support the children's creative processes. This needs to be balanced with the stated needs of some teachers for guidelines, lesson plans and workshop materials. In the kind of creative learning environment portrayed in BEAST!, rigid sets of objectives can place limits on what individual groups of children can achieve. This is because using the creative methodology is a developing process the ending of which cannot be predicted at the outset. It is difficult for teachers and practitioners that have not used this approach before to have the confidence to 'hold' the space that often occurs at the outset of the work and which can be described as 'creative chaos'. Arts practitioners are often more confident and familiar with this because of their training and practice and embodied this in workshops and teachers learned and were inspired by what they observed. Teachers reported that they learned these skills however from arts practitioners:

5.7 Views on collaboration between teachers and arts/science practitioners

Collaboration through every level of the project has been shown to be vital in the delivery of the good outcomes. In this final year of the project the level of collaboration with the teachers and practitioners and Baboró was significantly increased with many more meetings and contacts and was fundamental to the success of the project. The previous findings in this chapter demonstrate that it is very important that practitioners and teachers and principals understand clearly and agree their roles in the delivery of workshops. This takes some negotiation in the early planning stages. The practitioner is

there to bring the passion, knowledge and skills from their area of expertise. Additionally to convey a different more relaxed style of interacting with the children in order to encourage and develop critical thinking and inquisitiveness in the children. The role of the teacher is also vital as they know the children's abilities and stage of development. Teachers are needed in order to bring their philosophy and teaching skills to support the practitioner. They are needed in order to provide links with the children's existing knowledge and to provide help with challenging behaviour. Generally practitioners and teachers saw that any challenging behaviour displayed at the start soon disappeared when the children became fully engrossed in the purposeful activities. One feature this year which had a positive impact was the initial meeting with teachers, practitioners, children and the Artistic Director of Baboró. The activities and 'creative chaos' process helped to more closely align the needs of the children with workshop design and resulted in more commitment and ownership of the project by the children and teachers. Moreover where teachers were fully engaged with the workshops it impacted positively on the children's engagement and in some instances on the children's level of enjoyment (Field Observation Notes 2012/2013/2014).
Teachers and practitioners modelled good collaboration practices in the workshops and the children learned from observing these. They displayed strong collaboration and sharing. They were very supportive of each other in situations where there was competition for tools and other resources.

5.8 Achievement of BEAST! objectives

All teachers; parents; arts and science practitioners and funding stakeholders asked about the achievement of project objectives perceived that BEAST! had achieved its objectives:

> '*Yes it has; very definitely [achieved its objectives], It was a good experiment – it worked' (*Funding Stakeholder 1)
>
> *'Fantastic opportunity for the children and the school..it has given the children an alternative way of learning'* (Survey of Parents)
>
> *'Yes it did achieve the environmental issues and the creative activities and the legacy project. Yes without a doubt; grade A standard'* (Teacher 1)
>
> *'It was most successful and that is down to the planning of the team'* (Teacher 2)
>
> *'All the objectives were achieved. Quite incredible'* (Scientist 3)
>
> '*We look for excellence [and this project]* **provided** *scientists with expertise that teachers may not have'* (Funding Stakeholder 2)

5.9 Learning from BEAST! for the project model

Practitioners identified that one strength of the BEAST! Model is the flexibility of the programme. Scientists received a very broad brief and develop their workshops in response to the children and in this way were able to tap into the children's interests and lived experience so that they become more enthused and involved. Artists designed their workshops to respond to the science topics that the children learned and to enable the children to create the legacy project. The key lessons from the research for the project model are highlighted below.

5.9.1 Importance of school, principal and teacher buy-in

One of the impacts of the model observed by the social researchers and teachers is that the longer timescale of the project (over a three year time scale) has allowed for the project learning to infuse throughout the individual schools teacher cohort, as different teachers become involved and as discussions take place amongst the teacher cohort regarding the project impacts. This extends the impacts of the model to a wider teacher population;

> *'The message got throughout the school and the students council were involved and the feedback from the rest of the school teachers were that they were very happy and enthusiastic'* (Principal 3)

There were concerns in the early stages that the project would be too demanding for the class timetable:

> *'It was a worry at the start that it would be too demanding [timetable wise] but it seemed nicely balanced'* (Principal 1)

5.9.2 Clear and comprehensive briefing on the teaching methodology and approach.

Baboró took on board the findings from BEAST! II and engaged with schools and teachers around full and comprehensive briefings on what to expect in the workshops this year. It is necessary that the school be fully brief on what to expect with a BEAST! project. Because of the more relaxed style of session and techniques that may be used with the children in order to devise child centred activities, sessions may be louder than usual in the early stages. Schools need to be prepared for some level of 'creative chaos' as practitioners work with children.

Moreover schools need to be aware that that there may be a need for flexible timetabling for workshop sessions and the availability of different room spaces such as school halls and outside spaces for different activities. Teachers and practitioners need to work closely in planning and organising these aspects of workshops.

5.9.3 The workshops need to be child-led to retain high levels of engagement and ownership

Practitioners noticed that the project provided different activities within sessions and children could select those that most appealed to them: '*There was something for everyone and they split into different groups that spoke to their different aptitudes and it was a chance to find their own voice'* (Artist 3)

The level of enthusiasm and curiosity displayed by the children is a good measure of how engaged they are and this is a good way of monitoring the appropriateness of the workshop delivery and contents. (Field Observation Notes 2012/2013/2014)

5.9.4 Clear set of criteria and scheduling – with flexibility built in.

It is necessary for practitioners and teachers to collaborate in order to agree a clear set of criteria and realistic scheduling of activities in order to achieve the workshop objectives. This needs to be balanced by allowing flexibility in the schedule to adapt to the children's needs; to allow for learning and for the 'chaos' associated with the creative process which has been a feature of the success of the project. This means that the objectives cannot be too rigid.

5.9.5 Modelling the acceptance of experimentation, change and failure as part of the creative process

Arts practitioners are familiar with the creative process and understand the role of experimentation and failure as part of creativity and innovation. Teachers that participated in BEAST! realised the importance of welcoming these features of creativity.

5.9.6 Passionate and expert science and art practitioners

Stakeholders identified that practitioners including artists and scientists must be passionate and enthused by their own subject and display the ability to inspire the children in order for this teaching methodology to be successful.
Teachers and Principals have seen that it is a real benefit to the project that Baboró have been able to access expert research scientists from NUIG through the relationship that they have developed with the Ryan Institute.
Additionally Baboró have been able to access expert practitioners of many art forms through their contacts.

> *'I saw a real unity between the artists and Baboró staff and this worked very well and I think you need that to do this project.'* [Teacher 3].

Through the three years of the project the children have had opportunities to engage with: poetry; sculpture; painting and mixed media; photography; filming; creative writing and script development; puppetry; theatre and backdrop design.

5.9.7 Project Co-ordinator

Baboró management identify that, with this form of creative project, it is essential that a co-ordinator is employed to track the developing processes. They are needed to ensure that operational issues are addressed speedily; to timetable schools and practitioners for the delivery of a large number of workshops over a short time period and establish good lines of communication and good working relationships. The fact that a project co-ordinator was employed throughout the process greatly facilitated its operation.

5.9.8 Awareness of NUIG and science and art careers as possible options for children

Children became aware of NUIG through visiting the university and through meeting the scientists and asked lots of questions regarding what it was like to study at the university, whether science or art could be possible careers for them.
Parents also spoke of their child's connection to the university:

> '*More connected with Galway, the Uni and arts in the wider community'* (Survey of Parents).

5.9.9 Relationship with Baboró and NUIG

The NUIG funding stakeholder discussed how it is a growing feature of the university that it should be connected with the local community[10]. Moreover NUIG has the remit of being strongly interconnected across disciplines. He identified that the BEAST! cross disciplinary approach had shown there was a real benefit in connecting university staff with the community [in this instance primary schools] and using this innovative approach. He also views that the benefits of the project learning should be generated across the campus and between disciplines. The project has an opportunity to enthuse other academics to explore this approach but the challenge is to incorporate the new knowledge gained from this kind of innovative project:

> *'I would like that academics and the science community [in NUIG] see this is another dimension to their work'* (NUIG Funding Stakeholder 1)

[10] Through the Community Knowledge Initiative (CKI) - See www.cki.nuigalway.ie) and other NUIG school initiatives such as 'Cell Explorers' (www.cellexplorers.com)

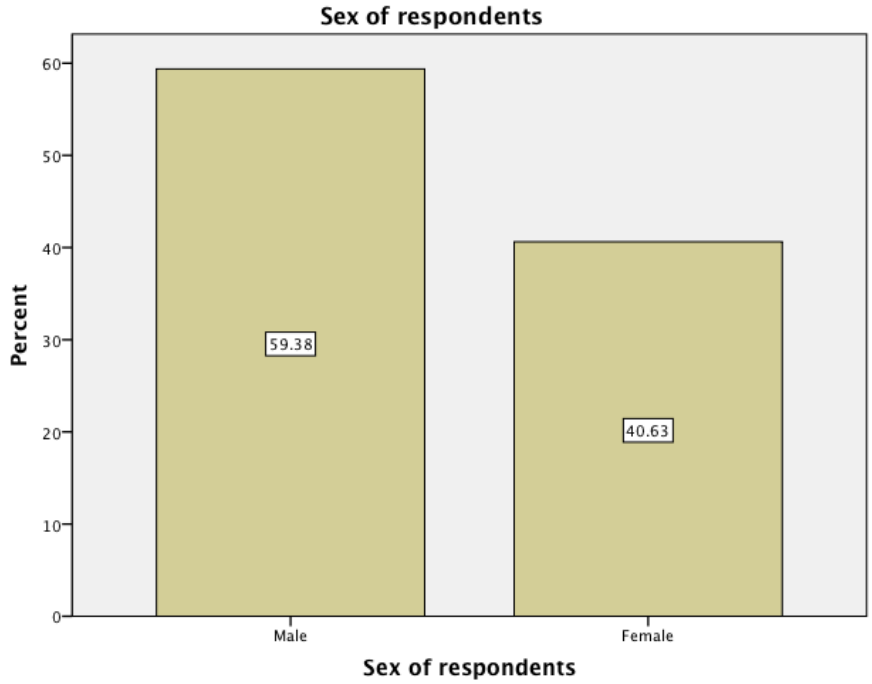
5.10 Findings from the Standardised Tools Administered to the Children

One of the core tasks of the research team in this study was to assess any attitudinal and behavioural changes towards science, art and the environment for the young people participating in BEAST! As noted in Chapter 3, data were collected from children at two time points, using questions from a set of pre-designed and tested standardised measures. This section presents the key findings relative to these data collection tools.

5.10.1 Sample Characteristics

As shown in Figure 5.1, of the 67[11] children who took part in the data collection at Time 1, 59% (n=38) of them were male while females accounted for the remaining 41% (n = 26).

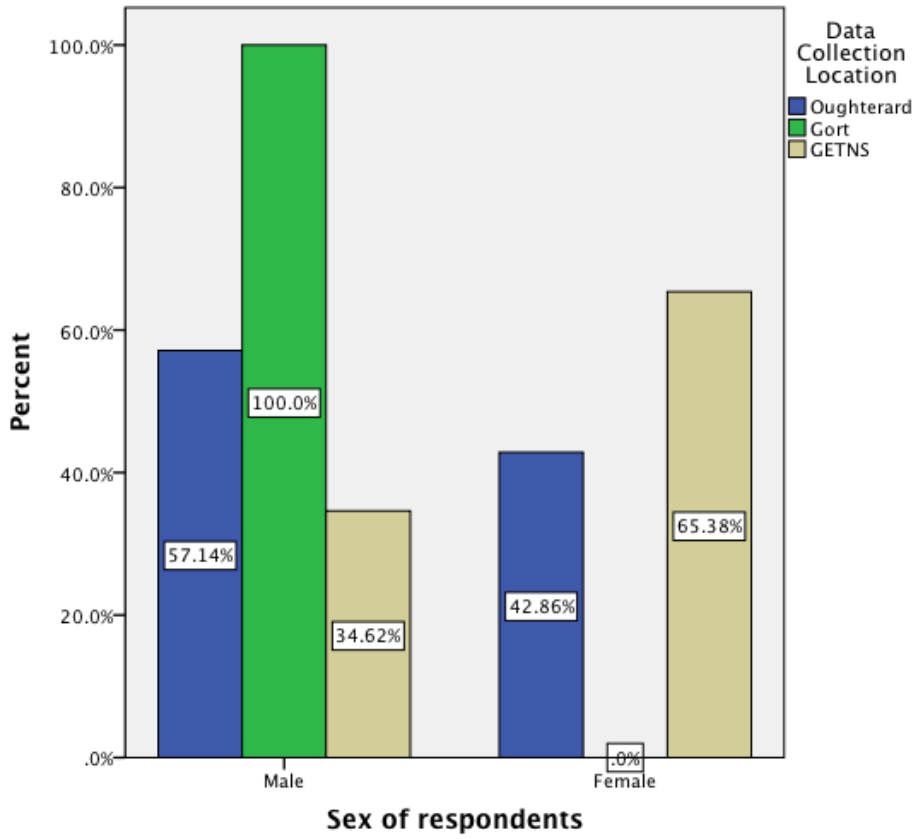
Figure 5.1



The breakdown of the sex of the children, by school, is shown in Figure 5.2. The complete cohort of children were male in Gort, due to it being a single-sex school. For Oughterard, however, 57% (n=12) were male as compared to 35% being male (n=9) in the GETNS. In terms of female participants, 43% (n=9) were from Oughterard as compared to 65% of females (n=17) in the GETNS.

[11] Three children did not answer this question

Figure 5.2 – Sex of Children in participating schools in Oughterard, Gort and the GETNS



5.10.2 Key Quantitative Findings

To make sense of the data emanating from the various standardised measures, the research team used one question to focus the work - *What gains were made by children participating in BEAST! between Time 1 (T1) and Time 2 (T2).* Where possible, paired sample t-tests were used, which allowed the research team to then report that any gains found to be statistically significant were unlikely to have been caused by chance.

What gains were made by children participating in the BEAST Programme Between Time 1 and Time 2?

Results from each of the standardised measures are now presented below.

Tool 1: A Measure of Belonging in Youth Development Programs (BYDP)[12]

In 2002 Anderson-Butcher, & Conroy developed a *Measure of Belonging in youth development programs (BYDP).* The five items contained in the tools all tap a common sense of belonging in youth development programs along the domains of support, acceptance, comfort, being part of and being committed to the programme.

As collecting data using this tool at Time 1 was not possible given the nature of the questions, the data presented below relates to Time 2 instead. A total of 58[13] children participated at Time 2, the results of which are shown in Table 5.1 and Figure 5.3. The

[12] Questions 1 to 5 on the BEAST questionnaire, p.1

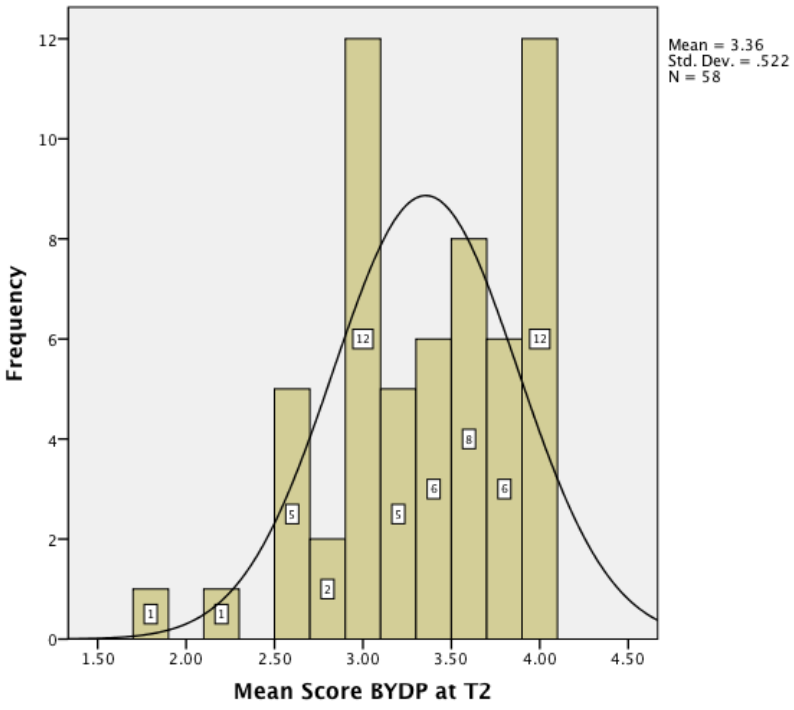
[13] A total of 9 children involved a T1 did not participate in data collection at T2 for thos measure.

mean score was 3.35 and the standard deviation was 0.521. Given that the maximum mean score possible on this scale is 4, the vast majority of the children scored extremely well, with 84% of them obtaining a mean score of between 3 and 4. This would indicate that this group of children felt comfortable, part of committed, supported and accepted when part of the BEAST! Project.

Table 5.1 – Mean scores for the Measure of belonging in youth development programmes at T2 for participating children

Scores	Frequency	Valid Percent	Cumulative Percent
1.80	1	1.7	1.7
2.20	1	1.7	3.4
2.60	5	8.6	12.1
2.80	2	3.4	15.5
3.00	12	20.7	36.2
3.20	5	8.6	44.8
3.40	6	10.3	55.2
3.60	8	13.8	69.0
3.80	6	10.3	79.3
4.00	12	20.7	100.0
Total	58	100.0	

Figure 5.3 – Mean Scores for belonging in youth development programmes at T2 for participating children



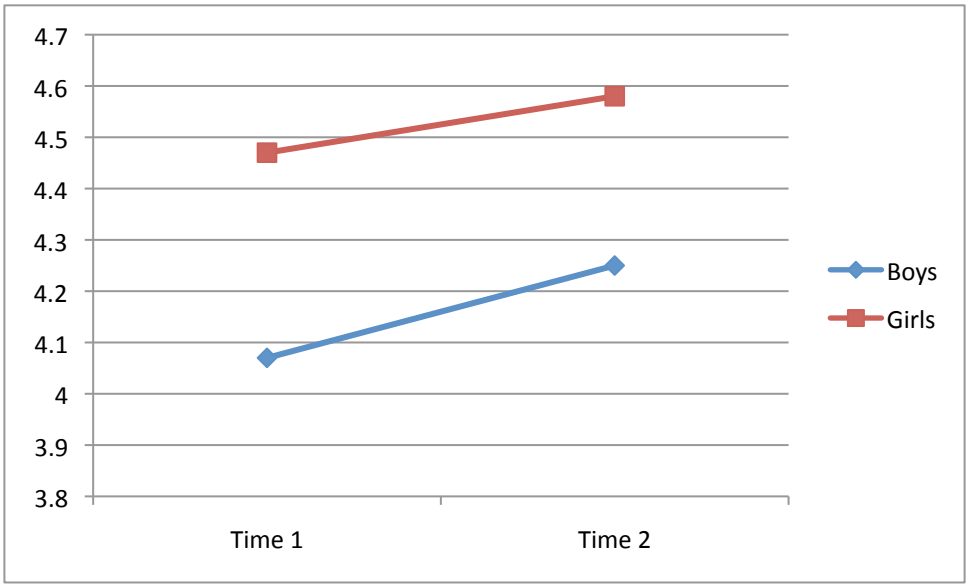
Tool 2: A Measure of Child Belonging in School (CBS)[14]

Stroud, Asher and McDonald (2009) developed the standardised *measure of child belonging in school (CBS)*. This tool has been developed to specifically measure the level of felt belonging of children towards school.

To investigate the change in the sense of belonging felt by the BEAST! children towards school between T1 and T2, a paired-sample t-test was conducted. The findings showed a slight increase in scores from T1 (M = 4.29, SD = .733) to T2 (M = 4.37, SD = 0.65) and these scores were not statistically significant (p = .328).

Figure 5.4 shows the relative mean scores at T1 and T2 for boys and girls and illustrates the overall increase from 4.07 to 4.25 for boys and 4.47 to 4.58 for girls. While both groups increased, the extent of this change is minimal. Therefore, it is fair to suggest that while participation in the BEAST cannot be said to have caused this increase, being involved in the programme for children was associated with this change. The key point here is of course that change as minimal as this is an indication of BEAST being associated with the maintenance of good experiences for children in school.

Figure 5.4 – Changes in the mean scores of child belonging in school (CBS) for boys and girls participating in BEAST! between Time 1 and Time 2



[14] Questions 6 to 11 on the BEAST questionnaire, p.1

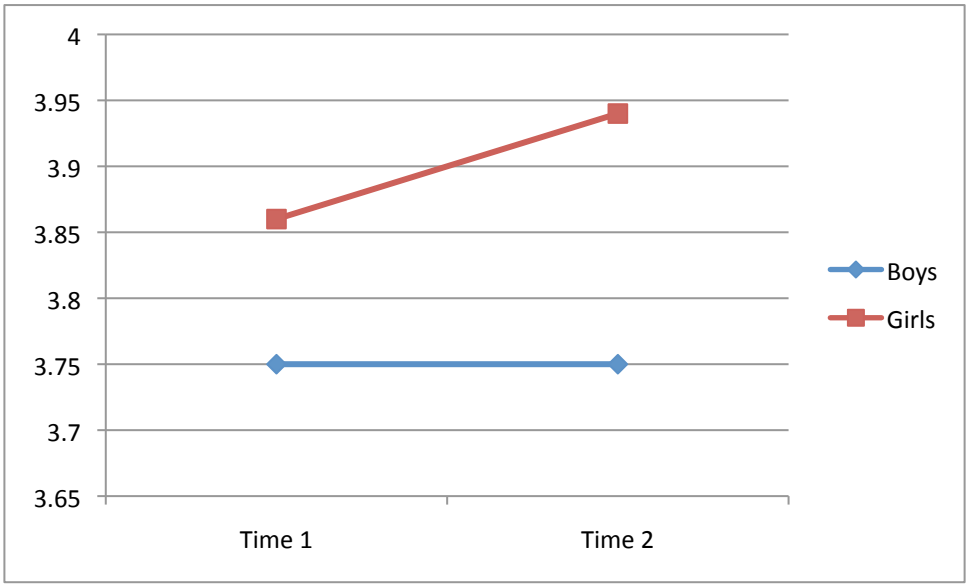
Tool 3: Perceived Social Competence Scale (PSCS)[15]

The third standardised tool administered to the children was developed by Anderson-Butcher, Lachini & Amorose (2007) and is called the *Perceived Social Competence Scale* (PSCS). This measures social competence among children, particularly those involved in settings emphasising prevention, early intervention and youth development. Competence is defined as *"...the degree to which children and youth engage in prosocial behaviours and are able to successfully create and maintain positive social interactions with others*" (ibid: 47). Social competence is linked with resilience in children and youth and the development of this attribute is viewed as a protective factor for children.

To investigate any change in the perceived social competence levels for the BEAST! children between T1 and T2, a paired-sample t-test was conducted. The scores showed a slight increase from T1 (M = 3.82, SD = .795) to T2 (M = 3.84, SD = .710), but the results were not statistically significant (p = .824).

Figure 5.5 shows the relative mean scores at T1 and T2 for boys and girls. It illustrates the unchanged scores for boys (3.75), while the scores for girls increased from 3.86 to 3.94. These results suggest that being involved in the BEAST is associated with these changes for this group of children.

Figure 5.5 – Changes in Mean Scores of Perceived Social Competence (PSCS) for boys and girls participating in BEAST! between Time 1 and Time 2



[15] Questions 1 to 4 on the BEAST questionnaire, p.2

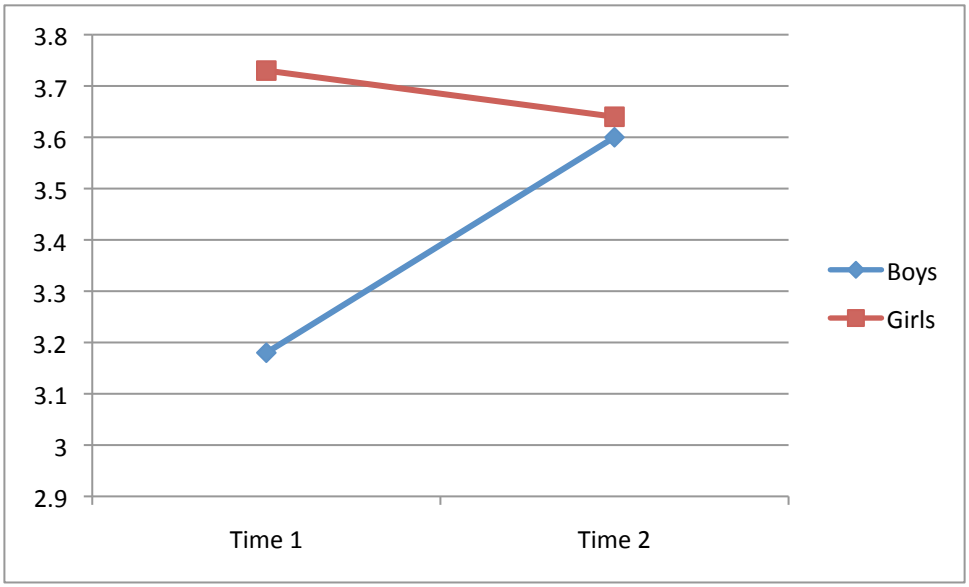
Tool 4: Children's Environmental Perceptions Scale (CEPS)[16]

The fourth standardised measure was developed by Larson, Green and Castleberry (2010) for use with 6-13 year old children. The tool consists of two sub-scales, the first one measuring *eco-affinity*, which … '*reflects personal interest in nature and intentions to engage in pro-environmental behaviour'*. The second subscale measures *eco-awareness* which *'…reflects a cognitive grasp of environmental issues related to the general importance and sustainability of natural ecosystems*' (ibid : 83).

To investigate any change in the levels of eco-affinity for the BEAST! children between T1 and T2, a paired-sample t-test was conducted. The scores showed an increase from T1 (M = 3.37, SD = 1.37) to T2 (M = 3.61, SD = 0.74). The results were not statistically significant (p = 0.162).

Figure 5.6 shows the relative mean scores at T1 and T2 for boys and girls for eco-affinity. It illustrates a rise in scores for boys from 3.18 to 3.60, while the scores for the girls decreased from 3.73 to 3.64. These results suggest that being involved in BEAST is associated with these changes for this group of children.

Figure 5.6 – Changes in Mean Score for Eco-Affinity for boys and girls participating in the BEAST! between Time 1 and Time 2

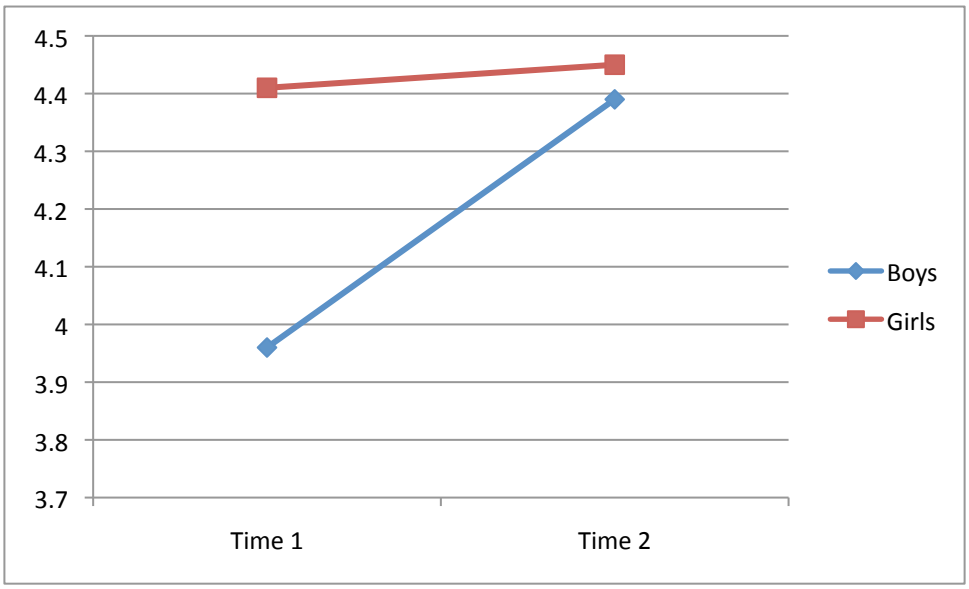


To investigate any change in the levels of eco-awareness for the BEAST! children between T1 and T2, a paired-sample t-test was conducted. The scores showed an increase from T1 (M = 4.08 SD = 1.43) to T2 (M = 4.40, SD = 0.60). The results were not statistically significant (p = 0.118).

Figure 5.7 shows the relative mean scores at T1 and T2 for boys and girls for eco-awareness. It illustrates an increase in scores for boys, going from a mean score of 3.96 to 4.39, while the scores for girls also rose, from 4.41 to 4.45. These results suggest that being involved in the BEAST is associated with these changes for this group of children.

[16] Questions 5 to 20 on the BEAST questionnaire, p. 4

Figure 5.7 – Changes in Mean Score for Eco-Awareness for boys and girls participating in BEAST! between Time 1 and Time 2



5.11 Summary

This section detailed some of the key findings of the BEAST! project and focused on the views of stakeholders such as children, teachers and principals, scientists, artists, parents, funding stakeholders and Baboró management toward the learning for the project in its third year of operation. Some of the key findings include that there continues to be widespread support for the project from all stakeholders and there are considerable benefits of the model for teaching and learning. The project has built on the learning from the BEAST! I and BEAST! II process study reports. All stakeholders identified that they, as well as the children were learning through involvement with the BEAST! project. Practitioners including scientists and teachers identified greater awareness around their own use of creativity in teaching across the curriculum and this is impacting positively for them and their pupils. They learned that in order for creativity to flourish that there needs to be some space for 'creative chaos' at the early project stages. The children are learning a great deal and gaining skills through their engagement with practitioners and are improving social skills through increased team work and collaboration.

The findings demonstrated that the longer lead in time facilitated planning processes for Baboró management and other stakeholders. The planning stage is critical to the success of any project and this is an issue that was addressed this year. The extensive and formalised briefing of schools by Baboró, the involvement of a Baboró staff member in the early workshop design stage and more collaboration between teachers and practitioners at each stage of the project has resulted in excellent outcomes this year. Practitioners with teachers built the workshops around the needs of the children and were also flexible where this was required. The children achieved more than teachers and practitioners had expected.

In terms of the quantitative data collected using the standardised measures, given the relatively short time frame between Time 1 and Time 2, it is only possible to see emergent trends in the direction and shape of the data. Nevertheless, there were slight increases in Tool 2 (Child belonging), Tool 3 (Social competence), Tool 4a (Eco-Affinity) and Tool 4b (Eco-Awareness), all pointing to the association of BEAST III with these changes. It is also worthy of note that there were distinct differences in the scores achieved for the male and female participants, across the range of standardised measures. In addition to these results, it is also important for BABORÓ to consider how best outcomes tracking such as this, can be built into the future development of their programmes. This in turn will enable them to continue engaging in real evidence-based planning and programme implementation.

The next section contains the main discussion and recommendations of the report and such issues are addressed in more depth here

Chapter Six: Discussion and Recommendations

6.1 Baboró BEAST! Process Study: Core purpose

The core purpose of this process study is to describe the project model, its modus operandi and the views of stakeholder groups about its impact. Previous chapters have identified the views of the individual stakeholder groups involved and were presented in order to provide clarity on differing perspectives about BEAST! and its legacy in children's scientific, artistic and environmental education. In this chapter these views are collated in order to answer the initial research questions and to arrive at the conclusions and recommendations.

The following analysis is based on the interviews, focus groups, observation studies, survey of parents and quantitative survey with stakeholders in the three schools that participated in the research. There is thus a caveat that although a significant amount of data has been generated, it is still a relatively small study from which to generalise the findings and readers should bear this in mind.

The research questions to be addressed in this chapter are the following;

- What is the core purpose of the Baboró BEAST! project?
- What outcomes are ascribed to the project as perceived by the young people, teachers, principals, parents, science and art practitioners, Baboró management staff and funding stakeholders?
- What are the perspectives of stakeholders regarding project delivery including its strengths, challenges and areas for improvement?
- Is the project model sufficiently robust that it can be replicated in schools and other settings for teaching STEM subjects?

BEAST! Core Purpose – Identifying the conditions for creativity to flourish in the teaching of STEM subjects in primary schools

The BEAST! project is a three year pilot project developed by Baboró to raise the profile of science and technology in the cohort of primary schools. Its main goal was to encourage the children and teachers to engage with STEM subjects and explore these subjects through the arts. This process study has also identified that the project has operated at a deeper level as all participants have been challenged to explore their creativity; to question and to reflect on their work. The outcomes of the collaborative reflections and of the process study have resulted in the identification of the key core conditions that have enabled children's, teacher's and practitioner's creativity to grow. This will be elaborated in the following sections.

6.1.2 BEAST! project aims and objectives

The BEAST! project aims and objectives were as follows: -

Project Aims

- To instil or improve levels of confidence, critical thinking, problem-solving, creative thinking and team working in primary school children
- To demonstrate in schools and to teachers the use of the Arts in teaching the school curriculum
- To explore a project model that can be replicated easily and effectively and be used by others to teach and to evaluate

Project Objectives

- To marry Science, Technology and the Arts in exploring a 'Low Carbon Future' with primary school children through a series of workshops delivered by Scientists and Artists
- To create an artistic response using the children's understanding of the topic
- To design and create a Legacy Project to remain in the schools
- To design and/or source quantitative and qualitative tools to collect data
- To observe workshops and document behavioural and attitudinal changes to evaluate the impact of the project.
- To write a process study report offering critical thoughts on the process and possible future developments for the BEAST! project

These aims and objectives will be the reviewed in this chapter under the research questions already highlighted at the start of this section.

6.2 Outcomes ascribed to BEAST! by Stakeholders

6.2.1 Outcomes for the children: Behavioural Changes, Attitudes towards Science and Creativity

One of the main objectives of the study was to make suggestions on whether or not there were any behavioural changes for the children, such as their sense of belonging at home or at school, their resilience and their attitudes towards the environment. The qualitative part of the study has shown that there is strong evidence for changes in attitudes of the children towards science and increased creativity. There is evidence for increased critical and reflective thinking; *'Has become more interested in the reasons "why" behind all things from nature'* (Survey of Parents). The quantitative data presented in the previous chapter also showed an increase across all of the measures used, specifically of interest here, eco-affinity and eco-awareness. While BABORO cannot claim sole responsibility for this positive shift in the children's attitudes, it now had the data to suggest that its work through the BEAST project, was associated with these changes.

6.2.2 Cross Curricular Teaching and using Creativity across the Curriculum.

As in the findings of the BEAST! I and II process studies, respondents continued to report strong support for the model and for the teaching methodology. Teachers and science practitioners discussed how the project has impacted on the way they teach in

terms of changing their style of teaching. Teachers have started to use creativity across the curriculum, adopted a more relaxed style and have also become more interactive with their pupils. They noted that they observed the importance of encouraging inquisitiveness and allowing time and space for children's questions in the delivery of workshops which encourages greater ownership and engagement with the learning materials. Practitioners, teachers and children observed that there were benefits to the more 'open' and 'flexible' approach to teaching and learning that enabled the children to learn and retain information and to collaborate well together. Children enjoyed the more informal method of delivery used by practitioners and maintained their enthusiasm and interest and their attention level was observed to be extended during workshops. Teachers and children became very engaged with the workshops and teachers facilitated and supported the scientists. Teachers identified the benefits of inviting outside practitioners into the classroom who were expert in their subject area and passionate about their subject and appreciated that scientists were able to translate ideas and concepts to make them accessible to the children. Teachers noted that the workshops enabled children who were usually less able or less involved to participate and state that this approach is successful in engaging children who may usually feel left out of activities.

'I saw good interest levels in the children and it was a great leveller for all the children especially disadvantaged children. Everyone was on a par and helped each other and compromised and the group work was excellent. (Teacher 1)

'*There was something for everyone and they split into different groups that spoke to their different aptitudes and it was a chance to find their own voice'* (Artist 3)

Scientists talked of how, through involvement with the project, they had become aware of the possibilities of using creativity to teach science concepts. They challenged themselves to apply more creativity to workshop content that would have more application and relevance to the children's lived experience so that they would become more engaged. Significantly, scientists also commented that they were more likely to reflect on their teaching practice through taking part in the BEAST! In the following extract for example, a scientist discusses his own conceptualisation of the BEAST! which he implies was a form of reflective space for him to think about his professional practice and challenges of communicating with young people;

'It reinforced things I learned in previous years making me reflect on the work I do and its impact for society and [puts me] in a reflective place. It contextualises what I am doing and I see the meaning of my work. I was challenged to communicate with the younger child to give them a purer more succinct message. There were a lot of benefits [to me] from the teaching and creative point of view as I was exposed to the viewpoints and different perspectives of the children. It's rewarding because we are developing techniques [in them] that will be used in their lives' (Scientist 1).

This point relates to findings of Varley (2008) discussed in the literature review (Chapter Two) which argues for more creativity and collaboration in primary schools (cf. House 2009). Importantly, this participant also implied that taking part in the BEAST! Enabled children to develop life skills that they will apply and develop further across the life course.

The arts component was developed further in 2014. One feature which had a positive impact was the initial workshop with teachers, practitioners, children and the Artistic Director of Baboró. In this workshop the children and practitioners took part in games and activities designed to stimulate their thinking and this 'creative chaos' process helped to more closely align the needs of the children with workshop design and resulted in more commitment of the project by the children and teachers. The use of a trained creative facilitator ('Creative Broker') that is able to contain the challenge of the 'noise of ideas and discovery' and then draw the learning together was a key factor that increased ownership of the project by children and teachers.

The widespread support for this teaching method demonstrates that it can be a very effective approach for the teaching of STEM subjects in primary schools and that marrying science and art together in very creative and interactive ways can be highly beneficial for children's learning.

6.2.3 Change in attitude towards science and technology

This teaching approach has demonstrated real benefits in that it was able to achieve the main project goal of changing children's perception of science/technology subjects and creating an interest and enthusiasm for the learning. *'I wasn't a science fan before; now I'm a really big fan'* (Children's Focus group 2)

Children applied the learning in their home contexts carrying out simple experiments and explaining concepts to their parents/families. Teachers also engaged with the science and extended the learning across curriculum subjects between workshops and after the project phase was over.

Scientists endeavoured to design the content so that it had relevance to the children's lived experience and children felt that their opinions had worth and this contributed towards their levels of engagement and ownership. The process of children working with scientists created a deeper understanding of the scientist's role and prompted some of the children to express an interest in science as a career. '*[It is a] great subject the way [scientist] explained. Some of us might like to be a scientist or a teacher.'*(Children's Focus Group 2)

These findings indicate that the objective of raising the profile of science subjects with the children was very successfully achieved and also had the impact of changing the way that children engage with science.

6.2.4 New Skills Acquisition

In all three case study schools the children learned real skills that included designing their own experiments. Teachers and parents noted that children demonstrated improved critical thinking and enthusiasm for learning. The teamwork and collaboration incorporated into workshops seemed to developed the children's social skills and children learned to collaborate well by observing the behaviour modelled by the teachers and practitioners.

Through the three years of the project the children have had opportunities to engage with a number of art forms such as poetry; sculpture; painting and mixed media;

photography; filming; creative writing and script development; puppetry; theatre and set design and construction and computer programming (Scratch Programming).

Teachers and scientists discussed how they were constantly learning through observing the practitioners and through their own reflection on the project processes and were incorporating that learning into their teaching styles.

6.2.5 Reflective Practice

Taking the time to create a reflective learning environment benefitted the project immensely. The process studies have documented the learning from the project enabled all stakeholder groups to express their reflections and this includes children as well as parents and funding stakeholders. Participants have been honest in their responses and critically evaluated their own and each other's contributions. It is this that has enabled each year of the project to improve on the previous years' outcomes.

> *'It has been fun, engaging, thought provoking with internal reflection ..questions about the meaning of your work, contextualising it more'* (Scientist 1)

6.3 Key Perspectives of Stakeholders regarding project delivery

There was general widespread support for the project throughout the stakeholder group. Overall, the project worked well and created an excitement and enthusiasm for the science/technology topics with children and teachers alike.

> *'I felt a strong commitment and heightened sense of joy and sense of pride that [the children] had really completed something'* (Teacher 3).

All teachers, arts and science practitioners and funding stakeholders felt that Baboró has achieved its on-going project aims and objectives in 2014 as detailed at the start of this chapter. This process study has identified some key elements of project model and the following section highlights these.

6.4 Is the Project Model sufficiently robust that it can be replicated for teaching purposes?

The experience of BEAST! over the three years of the project documented in the three reflective process studies has enabled participants to build on the learning each year. Across all the stakeholder groups the respondents felt that the implementation of the model worked very well in this third year of the project. *'In this third year the project matured [like] a well- oiled machine. A lot of lessons [from years one and two] were taken up and used. There was much more collaboration and reinforcing the curriculum [the children] were studying'* (Scientist 1)

One strength of the BEAST! model is that it is very flexible. Baboró generated the inspiration for the project, sourced the funding and provided the driving force to move the project forward. Baboró supported arts and science practitioners and schools to work with their own schedules around the programming of workshops. This work was done by a project manager who co-ordinated the challenging logistical and timing elements of the project and the many other issues associated in delivering a project of

this complexity. We conclude that the model is replicable in other schools provided that there is a willingness to embrace a culture of creativity by all stakeholders.

6.4.1 Learning from BEAST! 2014 for the Project Model – Providing the Ideal Conditions in which Creativity can Flourish.

Lessons from this process study and from the process studies for BEAST! I and II show that the achievements of the project model have been based around providing the conditions in schools for creative teaching and learning to flourish. These are summarised under the following headings: -

The Culture and Environment of the School should be conducive to creative practices

The project works best in settings in which there is a culture of openness to creativity and to exploring new perspectives about learning and different and new ways of achieving outcomes. Project originators can judge this by the level of energy and response by schools at the initial approach and to the support of school management and the wider school staff. It is important that at the early stage there is a clear and comprehensive briefing on the project teaching methodology and on what to expect so that there are realistic expectations.

Full buy-in by school principal and teacher

It is essential that the project receives the full support of the school principal as well as the class teachers involved. Good outcomes cannot be achieved unless teachers are fully supported by principals and fully engaged with the arts and science practitioners in the workshops.

> '*It's vital that the teachers are implicitly involved [bringing] their philosophy, teaching skills to support the practitioner[s]...the group meetings [and collaboration] made me feel very much involved and part of the drive and direction and [increased my] level of commitment'* (Teacher 3)

> *'The inclusion of teachers needs their buy-in. Some teachers do not feel creative and may need some form of self-development to be creative themselves'* (Principal 3)

Supportive attention and respect of teaching staff

In this project the support of the wider school was seen to enhance the learning for the children and class teachers. In one school children acted as peer teachers to other class groups and in another school, children played their video to the wider school to show them what they had achieved and also to share the learning to a wider audience. In all of the case study schools teachers from across the schools populations were aware of the project, interested in observing the outcomes and contributing to the discussions and recommendations.

> *'Feedback from the rest of the school. .teachers was they were very happy and enthusiastic and the student council was very involved as well so the message [was] throughout the school and they were involved'* (Principal 3)

Clear criteria and scheduling with flexibility built in.
It is necessary for practitioners and teachers to collaborate in order to agree a clear set of criteria and realistic scheduling of activities in order to achieve the workshop objectives. This needs to be balanced by allowing flexibility in the schedule to adapt to the children's needs; to allow for learning and for the 'creative chaos' associated with the creative process which has been a feature of the success of the project. This means that the objectives cannot be too rigid and ideally are 'open ended'.

Openness to the ideas of children, parents, teachers and practitioners
Where there is openness to the ideas of all stakeholders the experience and learning are enhanced. It is important to involve children and parents in parts of the planning and evaluation processes.

> *' I learned that there is huge capacity in the kids ..more than I imagined ...and in how much they were capable of doing/understanding. I was taken aback by that..they took on complex problems....when you can pitch something at the right level to kids and they bite....at the beginning the kids test the water, a bit of slagging etc but the nature of the project, they wanted to explore and the attitude shifted then ..it was <u>their</u> project and they didn't feel judged; there wasn't challenge then or behaviour issues.'* (Artist 2)
> *I learned [that] any fantastic idea, crazy idea – you can do it and have fun to a fantastic level. With kids everything is possible'* (Scientist 4)

Extensive collaboration with expert arts and science practitioners and through all levels of the project
The findings indicate that collaboration and discussion were key features in the project outcomes. There was collaboration at every level especially in year III; between Baboró and NUIG at the project design phase; between teachers and the science, technology and arts practitioners, and free flowing collaboration and team working with the children in the classrooms. Parents were involved with the project through homework tasks with the children and noted their children's improved team working skills. This evidence for collaboration further corroborates the findings of studies on the *Creative Partnerships* programme which identified one of the key characteristics of creative people as the ability to collaborate with others. Increasing children's ability to work in teams was also one of the BEAST! objectives and it was successfully demonstrated at each of the case study schools.

The longer planning and consultation stage enabled more focused work to be achieved. This included teachers identifying the ability levels of each class group, how the teacher and practitioner operated together during workshop delivery, how the science curriculum was to be addressed through workshops and other matters that related to the ethos and culture of the individual school.

The issues regarding the collaboration of visiting arts practitioners with primary school teachers are also discussed in the literature review (Chapter Two) which outlines the findings of two studies; AICE (2011) and Department of Education and Science (2006).

These indicate the importance of building a relationship between practitioners and teachers before the work starts so that realistic expectations are created. They should 'negotiate' their roles in the process and the practitioner should provide an outline of what will be covered and it is ideal if this connects with the school curriculum. The studies identify that it is vital that teachers are present during workshops in order to learn themselves and to draw out the learning for the pupils and build on the work between sessions and after they finish. In addition the process study has identified that children display more engagement when teachers are present and involved with the workshops.

Opportunities for choice and discovery of different art forms

The children were exposed to many different art forms and different science concepts and these were linked together to draw out the learning from each subject in many different ways. It resulted in new learning for the children as well as the teachers and arts and science practitioners. Through the three years of the project the children have had opportunities to engage with: poetry; sculpture; painting and mixed media; photography; filming; creative writing and script development; puppetry; puppet theatre and set design and construction and computer programming (Scratch Programming); science experimentation;

Teach and model techniques and strategies for creative performance by building creative skills

To develop new creativity of ideas there has to be space for chaos – similar to brainstorming in discussions' (AICE 2011: 25)

The quality of learning experienced by the children is in large part dependent on the passion, enthusiasm and expertise in their subject areas of the STEM and arts practitioners and this is a key element of the model and a key requirement of practitioners that become involved with workshop delivery. Their ability to model creative problem solving by involving the children and listening to their suggestions was essential. Other creative skills modelled by practitioners included collaboration and team working discussed above and the children learned how to collaborate by observing the practitioners.

Stimulate and reward curiosity and reflective thinking

The students were encouraged and rewarded for inquisitive questions and critical thinking. Opportunities for encouraging critical questioning and thinking were built into the workshops design. Children's suggestions were respectfully listened to and often integrated into the work and they responded by displaying increased ownership of the work. The process study carried out over the three years of the project enabled all stakeholders to engage in reflective thinking and this has also enabled the project learning and achievements to be captured.

Model willingness to experiment, fail and change

> '*You need to start with the child. The creative self needs to be encouraged and allowed to fail'* [Teacher 3]

The children had many opportunities to experiment and not all of these were successful. Where this was the case practitioners worked with children in exploring different approaches together and there was enough flexibility in the workshops to allow the

time for this. Children realised that there were many ways to do something. *'All through the 3 years there wasn't a unique way of doing everything and you could find a way of making it funner for yourself'* (Children's Focus Group 1)

Not all elements of the workshops design were successful. Where the project was responding to the children's identified needs and where they were involved in the decision making around the project objectives, children were fully engaged and had a strong sense of ownership. In one group of children the workshop objectives became too ambitious; the children became observers rather than participants; they retreated from engagement. One of these children said;

> *'I was kinda getting bored; we were just watching [practitioner] not really participating with [them]'*

On reflection the practitioner realised that this had happened;

> *'I needed to allow more time for flexibility; for admitting something isn't working and change'*

This can be seen as a tangible example that did not work effectively. Practitioners and teachers learned from this the importance of constantly checking with the children that they are involved and that their needs are being met. Their level of engagement and curiosity is a good guide as to whether this is the case. It highlighted and reinforced the key factors that produced the very positive outcomes for children that have been described in this process study. Taking time to learn from mistakes is crucial to developing creative skills in children and in adults and modelling the acceptance of failure as part of the process is essential for maintaining children's self-esteem. In addition the reflective space provided by the process study enabled discussion around these issues and for the learning to be deepened.

> *"Ever tried. Ever failed. No matter. Try Again. Fail again. Fail better*" (Beckett, 1983)

The impact of the strong links with Baboró and NUI Galway

Baboró has a history of linking with schools and the community in various projects and through the Baboró International Arts Festival for Children delivered in October each year. It also has good links to arts practitioners experienced in working with children. Additionally Baboró has developed a relationship with the Ryan Institute NUIG and is able to access scientists that are passionate and expert researchers in their field and that are able to translate science concepts for primary school children. These are key strengths of the BEAST! model.

It is important in a creative project like BEAST! which is spread over a number of schools, that a co-ordinator is employed to track the developing processes; to ensure that operational issues are addressed speedily; to time table schools and practitioners for the delivery of a large number of workshops over a short time period and establish good lines of communication and good working relationships.

In this form of project it will always be a challenge to ensure that practitioners are not just supported with good information, adequate resources and opportunities to collaborate with others but are also supported through the initial stage which can feel

'messy' but which is often a vital part of the creative process. Baboró are experienced in working with this form of creative process and are well placed to provide the appropriate support in the form of a 'Creative Broker' In other settings project originators may find it very useful to employ a facilitator with this form of creative expertise.

There is evidence that the model is robust if the above requirements are fulfilled. Baboró has achieved the project goal and the project objectives and are in a good position to move forward to disseminating the findings of the process study.

6.4.2 What does the Quantitative Data Tell us?

As already alluded to in previous chapters, the single most important reason for introducing a set of standardised measures for use with the children was to illustrate the usefulness of outcome tracking in studies of this kind. Of the five tools reported on in Chapter 5, the general finding was that the BEAST! children achieved very positive scores. The analysis of each tool also showed variations in scores for the boys and girls which is interesting and shows that programme design for the future must take gender differences into account. As suggested earlier, it is important for BABORO to consider how best outcomes tracking such as this, can be built into future programme planning. This in turn will enable them to continue engaging in real evidence-based planning and programme implementation.

6.5 Project recommendations

The recommendations arise from the process study findings and from the previous analysis and are summarised below: -

- There is a requirement for a formal briefing of school principals and class teachers at the early planning stage. This is in order to achieve full 'buy in' by schools and full understanding of the BEAST! project objectives which is important for achieving the full benefits of the project.
-
- There is an identified need for a facilitator ('Creative knowledge broker') in the planning stage to enable and encourage 'creative chaos' whilst children and practitioners and teachers explore ideas for workshops and then to help align the ideas in a cohesive plan. *To develop new creativity of ideas there has to be space for chaos – similar to brainstorming in discussions'*(AICE 2011: 25)

- There is an identified need for on-going meetings between teachers and science and arts practitioners to agree practical aspects of the project and to aid good planning. This should include discussions regarding the school culture and ethos; the needs and ability levels of the class group; the roles and responsibilities of teacher and practitioner during workshops and discussion around the science curriculum which will aid decisions around content and harness more learning for the children.

- High levels of engagement were observed in the children when they were involved with more interactive elements of workshops. This has been one of

the most successful outcomes of the project as it has facilitated 'deep learning' in the classroom. The findings demonstrate that workshops should continue to be designed to include a wide range of opportunities for interaction in different ways and should be built around the needs of the children participants.

- Collaboration needs to be prioritised at every level of the project and opportunities to collaborate, participate and jointly review should be built into project implementation.

- Dissemination of the project findings is the next phase of the project processes. At present there are videos of BEAST! and downloadable files of the process studies on the Baboró website which interested parties can access. It is recommended that a copy of the report or executive summary should be sent to participating schools and practitioners in order to disseminate the findings to the wider school and university populations.

- Within schools it would be useful to place the key findings of BEAST! on posters so that the wider school teacher population can become more aware of the project outcomes and learning.

- It would be beneficial to further engage parents during the intervention possibly including more exercises for children to do at home and regular updates to parents on the projects. This could be done via the schools' website or through school newsletters.

- Participant schools would like to continue and strengthen their links with Baboró and National University of Ireland, Galway.

- The NUIG funding stakeholder has identified that the project has shown the real benefits in connecting NUIG with the community and in using this innovative approach. The project has an opportunity to enthuse other academics across college disciplines to explore this approach and incorporate the new knowledge gained from this project. *'I would like that the science community (in NUIG) see this as another dimension to their work'*

Questions that remain to be answered

- How could this project be operationalised in schools and other settings?
- How do you teach and support teachers to be creative? (Possibly by designing and delivering CPD programmes?)
- Would it be useful to link interested schools?
- What would be the best mechanism for locating outside arts and science practitioners who are expert and passionate about their specialism?
- Is there a need for an organisation such as Baboró to link with arts practitioners and University or College STEM researchers to co-ordinate this type of project?

'I feel that the seed has sprouted but it hasn't taken or set down roots yet. It has given us plenty to ponder on and take forward – how to integrate creativity into every level/every subject and appealing to all aspects of the child' (Teacher 3)

Anderson-Butcher D., Iachini, A. & Amorose, A. (2007) 'Initial reliability and validity of the perceived social competence scale'. *Research on Social Work Practice* 18: pp.47-54

Anderson-Butcher D. & Conroy, D. (2002) 'Factorial and criterion validity of scores of a measure of belonging in youth development programs'. *Educational and Psychological Measurement* 62: pp857-876

Biggart, A., O'Hare, L. & Connolly, P. (2008) *A Need to Belong. An epidemiological study of Black and Minority Ethnic children's perceptions of exclusion in the Southern Area of Northern Ireland*. Belfast. Centre for Educational Research, QUB.

Land, K. (2007) 'Child and youth well-being Index (CWI)' Paper presented at the Inaugural *International Society for Child Indicators* (ISCI); Chicago.

Morgan, H. (2006) 'Social distance: self reports by Black and White school age children'. *The Negro Educational Review*, Vol. 57, No's 1-2, Spring/Summer, pp15-33

Neuman, L. (2000) *Social Research Methods. Qualitative and Quantitative Approaches* (4th edt.). Boston: Allyn and Bacon

Stroud, M., Asher, S. And McDonald, K. (2009) 'Assessing school belonging and its associations with loneliness, peer acceptance, and perceived popularity'. Paper presented at the *Biennial meeting of the Society for Research in Child Development***,** Denver, Colorado, April 2-4th

The International Resilience Project (2007) - *The Child and Youth Resilience Measure (CYRM) -28*. Retrieved from www.resilienceresearch.org

References

Ada, A.F. (1986) 'Creative Education for Bilingual Teachers' *Harvard Educational Review*, pp. 386-395

AICE. (2011) *Artists in Creative Education. Unlocking children's Creativity. A Practical Guide for Artists.* Available at http://www.artistsincreativeeducation.com [Accessed 15/8/2013]

Anderson-Butcher D. & Conroy, D. (2002) 'Factorial and criterion validity of scores of a measure of belonging in youth development programs'. *Educational and Psychological Measurement* 62: pp857-876

Anderson-Butcher D., Iachini, A. & Amorose, A. (2007) 'Initial reliability and validity of the perceived social competence scale'. *Research on Social Work Practice* 18: pp.47-54

Anderson, D., Lucas, K.B., Ginns, I.S., & Dierking, L.D. (2000) 'Development of knowledge about electricity and magnetism during a visit to a science museum and related post-visit activities' *Science Education*, 84(5): 658-679

Barnett, R. and Coate, K. (2005) *Engaging the Curriculum in Higher Education* Maidenhead, UK: Open University Press and McGraw Hill

Beckett, S (1983) *Worstward Ho.* London: Calder Publications

Bourdieu, P. (1990) *The Logic of Practice* London: Polity

Collard, P. (2014). *Student participation in The cultural rucksack* Den kulturelle skolesekken (available via http://www.creativityculture education.org/student-participation-in-the-cultural-rucksac, last accessed 31/03/2015

Collard, P. (2011) Artists in creative education: unlocking children's creativity – a practical guide for artists (available via http://mediation-danse.ch/fileadmin/dokumente/Vermittlung_ressources/artists_in_creative_education_guide.pdf, last accessed 31/03/2015.

Department of Education and Science. (2013) *Arts in Education Charter.* Available at:www.education.ie/en/publications/policy-report/arts-in-education.pdf

INTO (2009) *Creativity and the arts in the primary school* (available via http://www.into.ie/ROI/NewsEvents/Conferences/EducationConsultativeConference/EducationConference2009/20091103_ArtDiscussionDocument_Final.pdf, last accessed 31/03/2015)

Larson, L. Green, G. & Castleberry, S. (2011). 'Construction and validation of an instrument to measure environmental orientations in a diverse group of children', In: *Environment and Behaviour* 43(1) 72-79

Lin, Y.S. (2011) 'Fostering creativity through education – a conceptual framework of creative pedagogy research' *Scientific Research* 2(3): 149-155

Murphy, C. and Beggs, J. (2003) 'Children's Perceptions of School Science' School Science Review 84(308): 109-116

O'Donnell, S., Andrews, C., Brown, R. and Sargent, C. (2004) *INCA: The International Review of Curriculum and Assessment Frameworks Archive*. Qualifications and Curriculum Authority (QCA), London, 2004 http://www.inca.org.uk

Sawyer, R.K. (2004) 'Creative teaching: collaborative discussion as disciplined improvisation' *Educational Researcher* 33(2): 12-20

Shaheen, R. (2010) 'Creativity and Education' *Scientific Research* 1(3): 166-169

Stroud, M., Asher, S. And McDonald, K. (2009) 'Assessing school belonging and its associations with loneliness, peer acceptance, and perceived popularity'. Paper presented at the *Biennial meeting of the Society for Research in Child Development*, Denver, Colorado, April 2-4th

Varley, J., Murphy, C., & Veale, O. (2008). *Science in Primary Schools, Phase 1 Final Report*. Retrieved November 30, 2008 from http://www.ncca.ie/uploadedfiles/primary/Binder1.pdf

Appendix 1
THE BEAST Project

ID Number of Child / Name _____	**T1/T2**
Date: _____201	**M/F**

My Involvement in these Activities

I want you to think about the activities that you have been involved with in the workshops. I will read out five statements and there are four ways you can answer about what you think about being involved.

Items	Options			
1. I feel comfortable at the programme/activity	**1. NO!**	**2. no**	**3. yes**	**4. YES!**
2. I am a part of the programme/activity	**1. NO!**	**2. no**	**3. yes**	**4. YES!**
3. I am committed to the programme/activity	**1. NO!**	**2. no**	**3. yes**	**4. YES!**
4. I am supported at the programme/activity	**1. NO!**	**2. no**	**3. yes**	**4. YES!**
5. I am accepted at the programme/activity	**1. NO!**	**2. no**	**3. yes**	**4. YES!**

My Experiences in School

I would now like you to think about this school. I am going to ask you some questions about school and the friends you have here. For the next six statements, you can tell me how much you agree or disagree with things about your school.

6.I feel like I belong at this school	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
7. This school fits me well	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
8. I feel connected to this school	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
9. I feel welcome at this school	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
10. This school makes me feel like I belong	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
11. This is definitely my school	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**

How I feel about myself in School

Read the statements and **tick the one** that is true for you. 

Remember, this is how you feel about yourself when you are <u>in school.</u>

		Not often	Sometimes	Often
(1)	I feel good about myself	☐	☐	☐
(2)	I feel healthy	☐	☐	☐
(3)	I feel I am doing well	☐	☐	☐
(4)	I feel miserable	☐	☐	☐
(5)	I feel I have lots of energy	☐	☐	☐
(6)	I feel cared for	☐	☐	☐
(7)	I feel valuable	☐	☐	☐
(8)	I feel worried	☐	☐	☐
(9)	I feel I can deal with problems	☐	☐	☐
(10)	I feel bored	☐	☐	☐

Read the statements and **tick the one** that is true for you 

Remember, this is how you feel about yourself when you are **in school.**

		Not often	Sometimes	Often
(11)	I feel noticed	☐	☐	☐
(12)	I feel people are friendly	☐	☐	☐
(13)	I feel there is lots to look forward to	☐	☐	☐
(14)	I feel safe	☐	☐	☐
(15)	I feel confident	☐	☐	☐
(16)	I feel a lot of things are a real effort	☐	☐	☐
(17)	I feel I enjoy things	☐	☐	☐
(18)	I feel lonely	☐	☐	☐
(19)	I feel excited by lots of things	☐	☐	☐
(20)	I feel happy	☐	☐	☐
(21)	I feel I'm treated fairly	☐	☐	☐

My Friends

Can you think about the friends you have and probably see most days? How would you say you get on with them? .

1. I am good at making friends	**1. Not at all**	**2. A little**	**3. Some**	**4. A lot**	**5. Very much**
2. I help other people	**1. Not at all**	**2. A little**	**3. Some**	**4. A lot**	**5. Very much**
3. I ask others if I can be of help	**1. Not at all**	**2. A little**	**3. Some**	**4. A lot**	**5. Very much**
4. I get along well with others	**1. Not at all**	**2. A little**	**3. Some**	**4. A lot**	**5. Very much**

How I feel about Nature?

The next set of questions ask you how you think and feel about nature and the world around you.

5 I like to learn about nature.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
6 I like to read about plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
7. I would spend time after school working to fix problems in nature.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
8. I like to learn about plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
9. I am interested in learning new ways to help protect plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
10 I would give some of my own money to help save wild plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
11. I like to spend time in places that have plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
12. I would help to clean up green areas in my neighbourhood.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
13. My life would change if there were no plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
14. My life would change if there were no trees.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
15. Plants and animals are important to people.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
16. It makes me sad to see homes built where plants and animals used to be.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
17. People need plants to live.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
18. Nature is easily harmed or hurt by people.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
19. Plants and animals are easily harmed or hurt by people.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**
20. We need to take better care of plants and animals.	**1. Strongly disagree**	**2.Disagree**	**3. Neither agree nor disagree**	**4. Agree**	**5. Strongly agree**