



**Opening the Door to Creative Teaching and Learning  
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**Executive Summaries of Phases I, II and III of the BEAST! (Baboró  
Environment, Arts, Science and Technology) project**

**Contents**

<b>Magic can Happen!</b>	<b>Page 2</b>
<b>Captivating children - Through cross-curricular teaching of Art, Science and Technology</b>	<b>Page 7</b>
<b>Co-Creating the Legacy</b>	<b>Page 13</b>

# **Magic can Happen**

A Process Study Report of the Baboró BEAST! Project.

## **Authors:**

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

**September 2012  
School of Political Science and Sociology  
NUI, Galway**

School of Political Science and Sociology  
National University of Ireland, Galway  
Tel: 00 353 (0) 91 492290  
Web: [www.nuigalway.ie/soc](http://www.nuigalway.ie/soc)

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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, teachers, science, technology and art practitioners and parents 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

Baboró International Arts Festival for Children has operated for more than sixteen years and focuses on making art accessible to children of all ages including babies, toddlers and teenagers and their families. Baboró stages an Arts Festival for children in October each year and includes new and innovative works using the art forms of 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 this year 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)<sup>1</sup>, by encouraging children and their teachers to explore these subjects through the arts.

Representatives from Baboró engaged with the Ryan Institute, National University of Ireland, Galway (NUIG) to develop a brief that would attract the interest of scientists, technologists, engineers and other researchers and academics from the university population to design and deliver science projects to primary school children in Galway City and County. 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 impact on biodiversity and sustainability. Following on from the science workshops, a number of different arts practitioners, skilled at working with children, facilitated them to create their artistic interpretation of the science topics they had learned (explored). The work resulting from these engagements with the scientists and artists children will be presented present their art works at an exhibition and installation at Baboró International Arts Festival for Children in October 2012.

During the development phase Baboró engaged with the School of Political Science and Sociology at NUI, Galway to carry out a process study review. Researchers from the School worked with Baboró to refine the project objectives and design the research study. The research objectives are detailed in the methodology section (Chapter Two) 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.

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 production of artworks for Baboró International Arts Festival for Children in October and the documenting of the project model and project outcomes in a process study report.

Eight schools in County Galway took part in BEAST! Four were located in Galway city and four in rural towns and villages. The schools served a spread of populations that included a school serving a wide multicultural population and a school serving a socially and economically disadvantaged population. The young participants were predominantly in the 7yrs to 9 yrs age group and numbered 215 children.

Baboró facilitated a briefing meeting for science, technology and arts practitioners to meet with Teachers in April. They discussed aspects of workshop delivery, timings and other organisational aspects. Social researchers from the School of Political Science and Sociology,

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<sup>1</sup> 'STEM' subjects include science, technology, engineering and mathematics

NUIG were also present at the briefing 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 May to June. Each school received 4 ½ hours of science/technology workshops and 4 ½ hours of art workshops.

The research methodology for the process study included a literature review of research on science education methods in primary schools. The literature (Varley *et al.* 2008, Gilbert and Priest, 1997,) points to the benefits of field trips, working in groups and external practitioners visiting schools to teach. The long term UK study ('Creative Partnerships' 2002-2011) was a government funded educational initiative that was delivered in more than 2,700 schools and worked with more than one million young people. It examined the impact of using external, creative practitioners in the teaching of the science curriculum and demonstrated that there was a measurable improvement for the young participants in terms of improved attendance, behaviour and performance (Kendall *et al.*, 2008) compared to the rest of the UK school going population. This improvement was more marked in those schools that had been participating for more than three years.

The research methodology used a mixed methods approach in order to capture the project outcomes. This included participant observation at workshops and field trips, focus groups, personal interviews and purpose built data collection instruments that were administered to children pre and post intervention. Two out of the eight schools were studied in detail and case studies were generated using this material (Chapter Four). Scientists, technologists, artists, teachers and parents in addition to Baboró staff were interviewed on their perceptions of BEAST! In addition science/art practitioners and teachers were interviewed at a third school from a disadvantaged city catchment in order to capture perceptions from respondents at a Galway City school (Chapter Five)

All stakeholders expressed positive comments about BEAST! and that they would like to repeat the experience. 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. 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 observers in the two case study schools and in the Galway City school. 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.

The objective of improving levels of confidence and self-esteem in the cohort of children was not observed when the findings from the data collection instrument were analysed. It is suggested that in order to achieve changes in these measures it would be necessary to deliver more workshops over a longer time period.

In addition to the widespread collaboration 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 identified that they felt that the project could be further improved by increasing the opportunities to network and collaborate.

In relation to the teaching method adopted by the visiting practitioners, teachers were very positive about the benefits of the more open, creative and flexible approach adopted by

science and arts practitioners and felt this could be a very useful addition to the teaching of the science curriculum. They appreciated that practitioners were 'passionate' about their subjects and this was seen as a key element of the effectiveness of the model. Teachers discussed 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' project. There is thus 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 discussion chapter (Chapter Six) are in place.

The recommendations which arise from the process study findings include:

- The science brief should be broad to attract optimum numbers of science researchers.
- Collaboration should have a high priority at every level of the project and opportunities to collaborate should be built into project implementation.
- Increased numbers of arts workshops would provide children with more time to develop their artistic response to the science topics. Being involved in decision making increases the children's sense of ownership and their creativity but this requires time to explore freely.
- The initial project meeting (prior to project implementation) for practitioners should contain information regarding insurance, child protection issues, in addition to enabling participants to share details of their proposals and increase knowledge sharing. There should be a closing presentation of the work and of the learning for practitioners and Baboró to harness more of the project's benefits.
- When designing science workshops it is worth considering if it would be beneficial if the current science curriculum were consulted in order to build on the children's current understanding of key concepts.
- It would appear that children aged 9-12 are the most appropriate age group for this intervention in terms of level of comprehension for science concepts and motor skills for arts activities.
- The quantitative data collection instrument should be administered to all the children at all the schools that participate in future BEAST! projects. It would enable a comprehensive benchmarking process at the pre-intervention phase and at post intervention. This would support a more comprehensive capture of the project outcomes and of the impacts of the project for the young participants. If a future study also included a control cohort then this would add to the rigor of the findings.
- It would be beneficial to engage parents during the intervention possibly including exercises for children to do at home and with a final presentation of the children's work and learning to parents.
- Participants recommended that BEAST! should be repeated and that there should be strengthened links with Baboró and National University of Ireland, Galway.

# **Captivating Children - Through cross-curricular teaching of Art, Science and Technology**

A process study report on phase two of the Baboró - BEAST!  
Project

## **Authors:**

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

**September 2013  
School of Political Science and Sociology,  
NUI, Galway**

School of Political Science and Sociology  
National University of Ireland, Galway  
Tel: 00 353 91 492290  
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### **Acknowledgements**

Our sincere thanks to all the young people, teachers, the artist, science and computer technology practitioners and parents who took part in this research. Without their participation and open contributions, none of this would have been possible.

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Dr. Cormac Forkan



## Executive Summary

This is the second report in the process study that focuses on the learning from the BEAST! Project which is an educational arts and science project that has been developed and operated by Baboró since the project's conception in 2012.

Baboró International Children's Arts Festival has operated for more than seventeen years and focuses on making art accessible to children of all ages including babies, toddlers and teenagers and their 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 the art forms of 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)<sup>2</sup>, by encouraging children and their teachers to explore these subjects through the arts. This included film making, model making and poetry writing amongst other art forms.

Representatives from Baboró developed links 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 planned to use expert scientists and artists to work with school children and teachers to work with children to change their attitudes towards science and the environment.

During the development phase, Baboró engaged with the School of Political Science and Sociology at NUI, Galway to carry out a process study review. Researchers from the School 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 BEAST! Project*', which informed the design of the project in 2013. This report is the second process study based on the findings from the research carried out by social researchers in 2013. 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.

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 and the documenting of the project model and project outcomes in a process study report.

Three primary schools in County Galway took part in BEAST! in 2013 and these were selected from the eight schools that participated in the project in 2012. They were located across County Galway, in the following locations; Gort, Oughterard and Newcastle, Galway City. The schools

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<sup>2</sup> 'STEM' subjects include science, technology, engineering and mathematics

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 8yrs to 11 yrs age group and numbered 62 children in total.

Baboró facilitated a briefing meeting for science, computer technology and arts practitioners to meet with Teachers in April. They discussed aspects of workshop delivery, timings and other organisational aspects. Social researchers from the School of Political Science and Sociology, NUIG were also present at the briefing 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 May to June. Each school received 7-8 hours of science, 7-8 hours of creative writing/drawing and 6 hours of computer technology workshops. This comprised 13 workshops in total in each participating school.

The research methodology for the process study included a literature review of research on science education methods in primary schools. The literature, Kelly (2012), Rose (2009) and Alexander (2012), identifies the benefits of cross-curricular teaching. NCCA 2005, Ofsted 2002, Department of Education and Science 2013, point to the benefits of using arts in teaching. The long term UK study ('Creative Partnerships' 2002-2011) was a government funded educational initiative that was delivered in more than 2,700 schools and worked with more than one million young people. It examined the impact of using external, creative practitioners in the teaching of the school curriculum and demonstrated that there was a measurable improvement for the young participants in terms of improved attendance, behaviour and performance (Kendall *et al.* 2008) compared to the rest of the UK school going population. Reports on artist and teacher collaboration (AICE 2012, Department of Education and Science 2006) highlight the importance of preplanning meetings to facilitate the more effective delivery of arts workshops. Studies on the use of ICT in the delivery of education programmes by Hall and Schavarian (2011) found that *'where the children's curiosity was the engine for their learning, profound understanding of the topic evolved'* (2011:454) and Passey *et al.* (2004) found that ICT had a motivating effect on children's learning.

The research methodology drew upon a mixed methods approach to capture the project outcomes. This included participant observation at workshops and field trips, focus groups, personal interviews 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 artist, teachers and parents in addition to 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 second year of operation and 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 'shine' and also facilitated more able children to share their learning or experience. *'That's the beauty of it. It caters for every level'* (Teacher 4). 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 observers 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.

Children learned new skills such as creative writing, drawing and computer programming. They also demonstrated good recall, improved recording 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 'how things work'

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 identified that they felt that the project could be further improved by increasing the opportunities to network and collaborate

In relation to the teaching method adopted by the visiting practitioners, 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 learning more around the positive impacts of using creativity in teaching and were adapting their own teaching styles to incorporate creativity and cross-curricular, more relaxed approaches. Science practitioners identified that they were challenging themselves to use more creativity, to be 'child-led' and to incorporate more of the children's 'lived experiences' in order to create more enthusiasm and participation by the children.

Research participants stated that practitioners were highly enthused 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 discussed 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) are in place.

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

- In order to facilitate good project planning, it is ideal if funding could come on stream earlier in the project timescale. This factor needs to be accommodated in project planning as it is a recurring issue which has impacts for project management, schools and arts and science practitioners.
- There is a requirement for a more 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 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. It is recommended that workshops in 2014 should continue to be designed to include a wide range of opportunities for interaction and should be child-led where possible.
- Collaboration should continue to have a high priority at every level of the project and more opportunities to collaborate should be built into project implementation.
- In order to build on the learning from this process study it would be beneficial if Baboró management, teachers, arts and science practitioners and social scientists meet in order to reflect on the study findings and to engage in discussion around these. Practitioners identify that this would be very helpful in consolidating their learning from their engagement with the project and give them an opportunity to share information and learn from others. This would also facilitate the planning for BEAST! 2014.
- Dissemination of the project findings should be further considered. At present there are videos of BEAST! 2012 and a downloadable file 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 and wider community.
- It would be beneficial to further engage parents during the intervention possibly by including more exercises for children to do at home with parents.
- Participants would like to continue and strengthen their links with Baboró and National University of Ireland, Galway. *'To be honest I'd have trust in what Baboró would come up with. Its very well run and I'm very impressed and it's a great privilege for the children and myself to be involved with it.'*(Teacher 3)

## **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](http://www.nuigalway.ie/soc)

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### **Acknowledgements**

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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)<sup>3</sup>. 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.

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

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<sup>3</sup> 'STEM' subjects include science, technology, engineering and mathematics

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 Telegaél 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'*

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***'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)***