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Science Buddies – Engaging Students and Parents in Science Education at Primary and Post Primary Level

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Abstract

Cork Institute of Technology (CIT) Access Service organises and delivers a range of pre-entry, entry and post-entry support programmes for groups underrepresented at third level education. The CIT Science for Life programme is a CIT Access Service initiative developed in 2009. The aim of the programme is to encourage and support second level students to study Science as a subject in second level schools and at third level. The programme is delivered in schools that are part of Delivering Equality of Opportunity in Schools (DEIS) initiative, the Action Plan for Educational Inclusion within the Department of Education and Skills. Up to 2009, on the numbers of students progressing to CIT from DEIS schools in Cork City and County, indicated that the numbers of these students were lower than in non-DEIS schools.

Since its inception in 2009, the programme has grown significantly, it now has many successful collaborations with other third level institutes, local Industry, the local community and both primary and secondary schools. One such collaboration is the Science Buddies programme, initially piloted in the 2011-2012 academic year with one of CIT's Access Linked secondary schools. The Science Buddies programme works at breaking down barriers to education and to bring science to the community and home environments in areas experiencing educational disadvantage. The programme involves collaboration between the three main educational tiers, parents and the community. Key stakeholders are primary and secondary aged students their parents, teachers and the Home School Liaison Coordinators. Science Buddies explores the process of developing student initiative, which promotes science leadership, communication and inspires future scientists. This addresses a need that has been identified in the Hunt report (National Strategy for Higher Education to 2030) – "community education strategies have proven very effective in reaching out to non-traditional students" and promotes Science as a third level possibility within the context of educational disadvantage [1].

This paper explores the potential benefit of community engagement strategies between higher education institutes, primary schools students, secondary schools students, and their parents. The paper analyses student and parental engagement and reviews the potential benefits of early introduction to science through an inter-generational programme. The paper includes perspectives of the programme from the point of view of key stakeholders.

1. Introduction

Science Buddies was initiated through collaboration between the Science for Life Programme and St Patricks College, a constituent school of the CIT Access Service Linked Schools programme. The Science for Life programme is in existence since 2009 and delivers many school based and third level based initiatives with both students and parents. However, in this instance both the school and Science for Life programme were keen to deliver an initiative in which the students worked together with their parents and other primary school students within their community. It is well documented that parental school involvement has a positive influence on school-related outcomes for children [2].

2. Methodology

2.1 Programme Design

The Science Buddies programme was piloted in St Patricks College, Gardiners Hill, Cork. The programme was delivered by junior cycle students, 1st years (12-13 year) or 2nd years (13-14 year). These students were trained to deliver by the Science for Life Officer approximately two weeks prior to the main event. Parents of both the primary and post primary school students also delivered the programme. The parents were also trained by the Science for Life Officer two weeks prior to the Science Buddies event. In the intervening two weeks post primary school science teachers practiced and revised the experiments with their students, so that they could deliver to the best of their ability.

The Home School Liaison Coordinator (HSLC) liaised with the parents and primary schools in the locality regarding the Science Buddies event. On a specified date all the key stakeholders, primary students, post primary students, parents, science teachers, HSLC and Science for Life Officer came together to deliver the mini experiments. The criteria for the experiments were that they should be based on simple science, they are easily and quickly repeatable, and they are cost effective.
Three post primary school teachers were interviewed; two science teachers and one HSLC. Three students were interviewed. All three students had experienced the programme from both aspects; that of a primary school student and that of a secondary school student. Two parents were also interviewed, the parents, were parents of students in both the primary and secondary schools. Interviews took approximately between 10 and 20 minutes.

2.2 Teachers Questions

Q1 What did you perceive were the aims of the Science Buddies Programme?
Q2 Do you think the programme was beneficial for (a) the school, (b) the pupils, (c) the parents and (d) the teachers?
Q3 Which aspects of the programme were most successful?
Q4 Which areas of the programme need improvement?
Q5 As a teacher what were the benefits of the parents and students working together - Do you think the programme will have a lasting impact; as opposed to a fun day i.e. has it inspired students to continue their science education?

2.3 Students Questions

Q1 Did you enjoy the Science Buddies programme?
Q2 What was the most enjoyable part as (a) a post primary student and (b) a primary student?
Q3 What was the least enjoyable part?
Q4 If this programme were delivered in another school, what changes would you suggest I make?
Q5 Did you think it was easy to talk and explain science in front of your class?

3.4 Parents Questions

Q1 What were the aims of the programme?
Q2 What was the benefit of it being an intergenerational programme?
Q3 What was the most enjoyable part of the programme?
Q4 What was the least enjoyable part of the programme?
Q5 If this programme were delivered in another school what changes would you suggest I make?

3. Results

3.1 Teachers and HSLC

Q1 What did you perceive were the aims of the Science Buddies Programme? In question 1, the theme educational experience was prominent throughout, with one teacher stating that “the programme promoted both independent and cooperative learning in students”. Other themes that featured were transitions, engagement and relationships. With regard to transitions, it is thought that the programme enabled smoother transition between primary and post primary school.
Q2 Do you think the programme was beneficial for (a) the school, (b) the pupils, (c) the parents and (d) the teachers? With regard to the school, the prominent themes here were both relationships and learning in equal measure. Teachers found that the relationship between teachers and students, students and each other, students and teachers, and parents and teachers were extremely beneficial to the school. It was found that the relationships established between parents and teachers through this programme had a positive effect on the academic performance of students within the families involved. For example, in a senior cycle student who was indirectly involved via a younger sibling; it was noted that this indirect involvement, had a dramatic impact in the form of improved academic performance of that senior cycle student. Teachers found that the post primary school students learned well through teaching the primary school students “to teach, you have to really know and understand your subject.”
With regard to the benefits to the pupils, the most prominent theme was learning, with student confidence and moral also featuring highly.
Where the parents were concerned the most common themes that emerged were relationships and learning, followed by transitions. The teachers believe that it is important for parents to experience

post primary school in action and to positively experience science, especially if they have had no previous exposure to it via their own education.

In respect to teachers the most important theme was relationships, the positive relationships that the teachers forged with both the parents and students through the Science Buddies programme had a positive impact on all students' education within the families. Learning and student moral were other themes that featured in this section of analysis, the programme created a positive teaching and learning environment and served to demystify science to both the parents and both primary and post primary students.

Q3 Which aspects of the programme were most successful? The theme that stood out in response to this question was learning. The programme was found to be a worthwhile and valuable intervention for the key stakeholders. Students in particular learned important life skills such as organisation, team work and communication.

Q4 If this programme were to be delivered in another school, what changes would you suggest I make? Learning was the most prominent theme, all teachers including the HSLC, stated that no improvement was necessary. However, the HSLC suggested that the programme evolve to include post primary school students who had previously delivered the programme and were now in senior cycle in the school. These students could take the role of training the junior cycle students to deliver the programme and become involved in researching new, different types of experiments that the programme could deliver.

Q5 As a teacher what were the benefits of the parents and students working together? Do you think the programme will have a lasting impact; as opposed to a fun day i.e. has it inspired students to continue their science education? The most obvious theme in response to this question was learning, other prominent themes were student inspiration and relationships. "This programme really brings science into the home". It has inspired students to continue their science education, with some students applying to CIT via the Science for Life Officer link, to take part in work experience in the science laboratories in CIT School of Science and Informatics.

3.2 Students

Q1 Did you enjoy the Science Buddies programme? In this question the most obvious theme was a resoundingly positive educational experience.

Q2 What was the most enjoyable part (a) as a post primary school student, (b) as a primary school student? Learning was the most prominent theme and most notably it was science learning. It also inspired one student to pursue teaching as a career choice. In response to part (b) learning was also the most obvious theme, followed closely by transitions. It also inspired two students to consider science and in particular laboratory work as a career.

Q3 What was the least enjoyable part? The theme here was again positive educational experience, the students stated there was no unenjoyable parts.

Q4 If this programme were to be delivered in another school, what changes would you suggest I make? The most obvious theme in response to this question was teaching science, in particular to make the experiments more spectacular for boys.

Q5 Did you think it was easy to talk and explain science in front of your class? Learning was the most common theme here, in general all students found it hard to speak to speak in front of their peers but once they became accustomed to it, they enjoyed it and had fun.

3.3 Parents

Q1 What were the aims of the programme? The most prominent theme here was learning and engagement, in particular the engagement between the parents and the HSLC.

Q2 What was the benefit of it being an intergenerational programme? Relationships was the theme that stood out in response to this question, students of all ages enjoyed their families being involved in their education.

Q3 What was the most enjoyable part of the programme? Learning was the most common theme here, in particular science learning.

Q4What was the least enjoyable part of the programme? The theme that stood out was engagement, in a positive way, as the parents stated that no part of the programme was not enjoyable.

Q5 If this programme was to be delivered in another school what changes would you suggest I make? Positive educational experience was the prominent theme; both parents stated that no changes were needed.

4. Conclusion:

This paper sought to establish the benefit of parental engagement in science education. From the analysis carried out with the teachers, parents and students, it can be concluded that the Science Buddies programme was found to have an overwhelmingly positive impact on teaching and learning in the school. The results demonstrated that it brought science into the home, made science enjoyable, promoted Science as a third level possibility and as a career possibility. In this school, the programme served to break down educational barriers, through parental and familial involvement; there is a long standing history in education of developing collaborations between families and schools to promote academic success [2]. It has been previously been shown that families not schools are the major sources of inequality in students' performance [3].

Provisional research currently being carried out in CIT Access Service indicates that over 50% of students have decided that third level is an option for them as early as primary school, which would support the need for early intervention. Early interventions targeted toward children residing in areas that experience educational disadvantage have much higher returns than later interventions [3]. In this programme post primary school students were given the opportunity to leave their everyday persona and to shine academically, which in turn, allowed the teacher to view them in a different more positive light in a classroom setting. The current science curriculum offers little space for the student as an autonomous agent [4]; this programme provides a means to increase engagement which affords the students with opportunities to take control of their own learning [5].

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