Part 4. Why, What and Where to Next

We have told you about what we have done and some of what participants have learned through engaging in the project. You may have begun to understand something of why we did what we did. We now want to tell you more about the rationale that underpins the project, our explanatory principles and standards of judgment that inform the evaluation of the project, something of our growing understandings of creating contexts that enable educational development as well as development of expertise in STEM subjects, and what we currently see as possible future developments. We do so with the hope this will help you to draw critically and creatively on the knowledge and learning created through this project to improve what you are doing to develop opportunities for young people of school age and students in HE to: learn cooperatively to contribute to and benefit from their own learning and the learning of others; extend their enthusiasm, knowledge and practice as researching scientists; develop their knowledge of themselves, their passions for learning, what gives their lives meaning and purpose and how they might contribute to making this a world where humanity flourishes.

4.1 Rationale

The project rests on a number of beliefs (that which we believe to be true) and values (that which give our lives meaning and purpose). These are some of the assumptions of the project: that people (of all ages):

- Are capable of researching as experts to create knowledge of science, learning and themselves, which they value and in the process develop their expertise.
- Are capable of contributing to and benefiting from their own learning and the learning of others
- Can work and learn creatively and productively together and in the process learn to recognize, value and improve the individual and collective knowledge, expertise, experience and wisdom
- Learn best:

    - In convivial situations where what they feel they and what they create and offer are valued;
    - When they are engaged in learning to enquire into something of interest to them;
    - When there is time for thinking and dialogue
    - When there are a variety of opportunities for them to learn by having 'serious fun' which comprise 'hands on and brain engaging' activities which develop their expertise as a scientist, and generic skills and knowledge.

One definition of science is: the state of knowing: knowledge as distinguished from ignorance or misunderstanding – with ignorance defined as: a lack of

knowledge, understanding, or education (Merriam-Webster dictionary). We are distinguishing education from schooling and training as a values laden life-long process whereby a person learns to live a good life well to his or her own benefit, the benefit of others and contributing to the flourishing of humanity. How we help young people learn to live a good life for them selves is important and we are developing a pedagogy that might be seen as a response to, 'The Student's Prayer', that Chilean biologist, Umberto Maturana wrote:

Don't impose on me what you know,
I want to explore the unknown
And be the source of my own discoveries.
Let the known be my liberation, not my slavery.

The world of your truth can be my limitation;
Your wisdom my negation.
Don't instruct me; let's walk together.
Let my riches begin where yours ends.

Show me so that I can stand
On your shoulders.
Reveal yourself so that I can be
Something different.

You believe that every human being
Can love and create.
I understand, then, your fear
When I ask you to live according to your wisdom.

You will not know who I am
By listening to yourself.
Don't instruct me; let me be.
Your failure is that I be identical to you.

We are also mindful that education is a process by which a person learns to live a life that contributes to the wellbeing of others and society as well as their own. These values are what Crompton, in his report *Common Cause: The Case for Working with our Cultural Values*, drawing on Schwarz, refers to as intrinsic or self-transcendent values. These:

> '… include the value placed on a sense of community, affiliation to friends and family, and self-development…
>
> Intrinsic values are associated with concern about bigger-than-self problems, and with corresponding behaviours to help address these problems.' (Crompton (2010), p.10)

Ginott (1972), an Israeli schoolteacher, child psychologist and psychotherapist, illustrates the importance of developing shared meanings of education that does not simply reflect an individual's concern for their own betterment:

> 'On the first day of the new school year, all the teachers in one private school received the following note from their principal:
>
> Dear Teacher,
> I am a survivor of a concentration camp. My eyes saw what no man should witness:
>
> - Gas chambers built by *learned* engineers.
> - Children poisoned by *educated* physicians.
> - Infants killed by *trained* nurses.
> - Women and babies shot and burned by *high school* and *college* graduates.
>
> So, I am suspicious of education. My request is: help your students become human. Your efforts must never produce learned monsters, skilled psychopaths, educated Eichmanns. Reading, writing and arithmetic are important only if they serve to make our children more human.' (p.317)

This may seem serious and negative in contrast with the positive and upbeat feeling engendered through the project. It is included here to keep in clear focus the purpose of the project, which was educational and not simply to train budding scientists, technologists, engineers or mathematicians or introduce them to exciting career possibilities.

Understandings and methods of research take many forms. Peter Medawar, a Nobel Prize winning scientist, wrote, 'If the purpose of scientific methodology is to prescribe or expound a system of enquiry or even a code of practice for scientific behaviour, then scientists seem to be able to get on very well without it.' (Medawar, 1969, p.8). The form of research we are concerned with is a process of creating knowledge rather than just one of acquiring knowledge that has already been created. Elliot Eisner, well known for his work in arts education, curriculum studies, and educational evaluation, said, 'We do research to understand. We try to understand in order to make our schools better places for both the children and the adults who share their lives there' (Eisner, 1993, p.10). We go further than Eisner and say that we do research to try to understand in order to make this world, and not just our schools, a better place to be for all.

One of the research methods we introduced was TASC (Thinking Actively in a Social Context) (Wallace, 2008). We introduced TASC (Figure 41) as it can be understood and used creatively by young children as well as adults, to research their learning and questions of interest, in various fields as apparently diverse as, for example, science and art.

Figure 41 TASC (Thinking Actively in a Social Context) (Wallace, 2008)

4.2 Learning and Knowledge That Has Emerged

A great deal has and continues to emerge. For instance:

- The young people learned how to work with others as co-learners and knowledge-creating researchers. They persisted over 6 months to develop their enquiries, creating and evolving their own questions, and dealing with the trials and tribulations that real researchers face. They learned and valued something about themselves and grew in confidence to share their knowledge, learn from critique and contribute to the learning of others.

- The postgraduate students learned a lot about communicating with a lay audience. The learned about themselves and developed skill and insights as Supervisor and student as they worked with the young people. They became role models as well as sources of knowledge and made a substantial contribution to the community.

- We, the Project Leaders, learned how important the interest, support and encouragement of parents, family, adult and peer friends is for young people to maintain their commitment and enthusiasm to research over time. We also learned how busy young people are and the compromises they have to make to meet the various demands made of them in and out of school.

- We extended our practice, creating cooperative educational learning opportunities that integrated fun and experimentation. We learned to integrate different types of learning opportunities (Figure 42) into the sessions and throughout the programme; broadening the cognitive, social, and personal palette from which learners can draw and extend through playful experimentation (type 1); extending skills, expertise and knowledge of science and other disciplines and fields as a researcher (type 2); and supporting young people as experts researching a question of personal interest, in a disciplined manner, within a time frame and with a valued outcome (type 3).

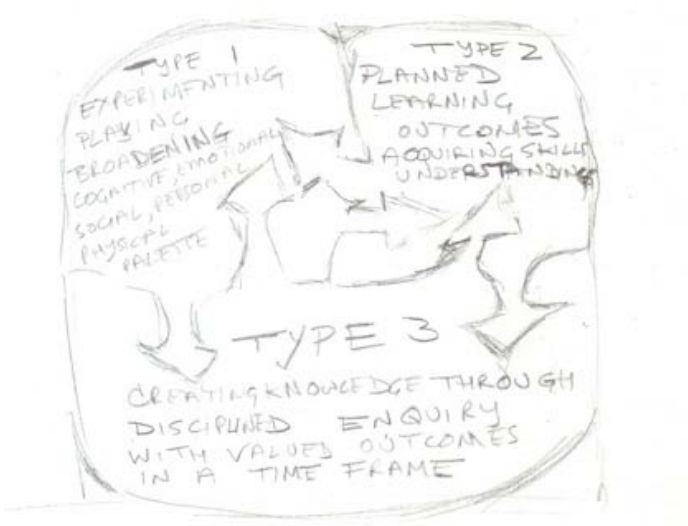

Figure 42 Renzulli's three types of learning opportunities

- We all learned how to value and pool our diverse experiences, knowledge and expertise to produce a creative and very productive tension. Together and with the young people and postgraduate students we produced more than each of us could have managed individually.

4.3 Explanatory Principles, Standards of Judgment and Evaluation

As this is educational research, the evaluation of the project is concerned with more than just standards reflecting instructional purposes. It is also concerned with the educational influence that participants have had in their own learning, the learning of others and the learning of the social formations, which are the context of the project – that is the community, BRLSI, and the University of Bath.

As can be seen in the preceding sections of this publication the Young Researchers developed and valued their knowledge of themselves, of what it is to be a researcher, deepened their understanding of their own learning processes, and developed their confidence and ability to generate and research questions of interest to them. The Supervisors refined and deepened their educational practice and understanding of supervising knowledge-creating research, of communicating and sharing knowledge, and of supporting learning. The Project Leaders developed their understanding and practice creating an innovative educational opportunity for those with an enthusiasm for developing their abilities to research as scientists, technologists, engineers or mathematicians.

Creating an account, such as this publication, is part of our research process. It is important that the publication communicates to a diverse audience, comprising laypersons in the community and educational-practitioners working in schools, Further and Higher Education and Business. It is also important that the research is of high academic and scholarly quality, that is, the arguments are reasonable and well reasoned, and there is evidence of creative and critical engagement with existing knowledge – we see further when we stand on the shoulders of what has been already created.

As this is educational and practitioner-research we have used a Living Theory research methodology (Whitehead, 2008). With this methodology the questions we ask include:

- Is what we have written comprehensible?
- Is there sufficient evidence to justify the claims that are made?
- Do the writings show sufficient understanding of the sociocultural and socio-historical influences in the context of the practice?
- Do the writings show that individuals are authentic in the sense of living as fully as possible the values they claim to hold, over time and interaction?

We ask for responses that are not only judgmental in the sense of being critical, but also creative and educational in the sense of helping us to improve our practice and knowledge-creating research.

So far we have asked a few academics and educational professionals to respond to drafts of this publication. This is an example of a response from an academic who is an educational professional:

> ‘Here are the 5 values I discern through the writings for the BRLSI book:
>
> I can feel your democratic value of enabling the voices of all participants to be heard.
>
> I can see evidence of your commitment to enabling young people to focus on something that matters to them and to engage in enquiry learning researching their own interests.

I can see evidence of your commitment to enabling your people to become researchers in the sense of engaging in a disciplined way with their own enquiry/topic and (very important) sharing an account (making public) of their enquiry.

In the collection of the posters, text and context I can see evidence of the expression of your passion to focus on learning that is worthwhile to the learner.

Through the text as a whole I can see evidence of your desire that individuals come to understand better themselves and others within democratic and co-operative relationships.' (Personal email 11th July 2015)

We would welcome responses from readers of this publication to help us improve it and to improve our research.

4.4 Possible Future Developments

We, individually and together, intend to develop enquiries researching problems such as:

- How do we each use our experience to improve the programme for next year?
- How do we repeat the programme but in an improved format and adapt processes and procedures?
- How do we develop a similar, but different programme for older teenagers (6th formers)?

The influence of this BRLSI project can be seen above to include the commitment of individuals to work together to live as fully as possible the social and educational values and purposes of BRLSI. We use the TASC wheel (Wallace, 2008) as a systematic and disciplined form of enquiry that supports individuals in making public their accounts of their research and their explanations of their educational influence in their own learning and in the learning of others. These accounts of these explanations comprise an individual's living-educational-theories (Whitehead, 1989). We are hoping to extend our narratives with multi-media data that can show in more details the meanings of our values as we work to fulfil the purposes of BRLSI.

A few preliminary thoughts for the next programme 2015-2016 include:

- Providing a support session for PhD students before the programme begins, using two or three, three-minute excerpts from early session videos to illustrate:
    - PhD students 'fears', diffidence, forebodings and aspirations
    - Research strategies/processes and expectations and how to explain them to teenagers

    - Monitoring the interest of teenagers through body language and 'sub texts' to conversations

- Building into the new programme a way of using the videos, especially in the early sessions, to monitor the responses of the participants with a view to remedying and supporting

- Building into each session 'hands on' fun sessions to develop skills and 'homework' to encourage the use of the skills thus acquired. e.g. description, observation, recording, analysing

- Developing the research portfolio and making more use of planning and reflection sheets

- Building into the sessions various ways of recording including the use of 'iPads/tablets for recording and developing presentation of posters for mini-conference and inclusion on the website.

- Exploring ways in which the website can be developed to provide support and communication between participants and links with families.

The educational influence we have each had in our own learning, the learning of others and the learning of the social formations we are variously part of will only be known over time. The success of our efforts to make our knowledge publically accessible will be evidenced by whether or not our account stimulates your imagination and contributes anything to your efforts to improve educational experiences and learning as you develop your own science and educational research projects. How could we improve our account? What are you doing that we could learn from? We would really love to hear from you – coolbookings@brlsi.org

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