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Enquiry-Based Learning in the Primary Classroom: student teachers' perceptions

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ABSTRACT

Enquiry-based learning (EBL) in primary schools is a constructivist approach which has a strong focus on children asking questions, working together, selecting and interpreting sources, on collecting information, and on interpreting and analysing what is found. This paper reports the results of questionnaire surveys and focus group interviews carried out with a sample of primary teacher education students at three teacher education institutions in Ireland, north and south, with the aim of uncovering the students' experiences of EBL in their own education and during their school placements so far, as well as discovering their understanding of what EBL is and their opinions about EBL as an educational approach. Results revealed that the students' recollections of EBL were mixed. During college school experience blocks the students displayed a clear understanding that it was the element of pupils being pro-active which was most indicative of EBL work. They recognise the importance of EBL at primary level. While being realistic about the challenges involving both practical implementation and time issues which EBL work produced, they appear not to have been put off from using EBL approaches in their future teaching careers.

KEYWORDS

Enquiry; enquiry-based learning; teacher education

Introduction

Enquiry-based learning (EBL) has a long history in the primary school in various forms. Most young children display great curiosity and interest in the world around them, constantly asking questions about what they see and hear. It could be argued that the objective of all teaching should be to develop children's ability to become independent enquirers and autonomous learners – something which will equip them with the life-long, transferable skills they need. This is especially pertinent in the context of addressing some of the critical issues of our time such as climate change and sustainability. Today's children will need to be able to think conceptually, combining creativity and analysis, and EBL work in schools can be seen as an effective way by which to achieve this (Austin, 2019). EBL is recognised as a stance that 'underlies our approach to living as learners' (Short, 2009).

The research summarised in this paper is an element of a wider, funded research project by four teacher educators in Ireland (Austin, Bacon, Greenwood and Pike, 2020) representing institutions in both the Republic of Ireland (ROI) and Northern Ireland (NI). It focused on the extent to which Initial Teacher Education (ITE) courses in our three institutions present EBL to primary teacher education students, how what we termed the 'multiplicities of enquiry' can best be incorporated into teacher education courses and at classroom level, and to what extent these multiplicities impact student teachers' understanding, confidence and practice. By multiplicities of enquiry we envisage students thinking about enquiry in three inter-related ways: as an intrinsic component of their learning as teachers; as enquiry is modelled by lecturers for students' use in the primary classroom; and as the students experience EBL when they are teaching on school placement, as well as in other ways. The hope was that the research would lead to greater understanding of how our pedagogical practices could contribute to the quality of learning experiences of our students and prepare them for a career in education.

This paper restricts itself to reporting the results of questionnaire surveys and focus group interviews carried out with a sample of primary teacher education students at the authors' three teacher education institutions with the aim of uncovering the students' experiences of EBL in their own education and during their school placements so far, as well as discovering their understanding of what EBL is and their opinions about EBL as an educational approach.

Although the wider research on which this paper is based encompasses the national curricula in both ROI and NI, some of the examples given are in the context of the primary school curriculum in Northern Ireland, where the lead author works. In addition, a number of the sources cited in the discussion below are from writing and research about primary geography, reflecting the particular background and interest of this paper's lead author.

EBL: History and Theoretical Underpinnings

The EBL approach is firmly rooted within psychological theories of learning, notably ideas related to constructivism (Pickford, Garner and Jackson, 2013). Constructivist theories, based on the work of Vygotsky, Piaget, Bruner, Dewey and others, emphasise the role of the learner in developing strategies to build their own knowledge and understanding. Enquiry is a process of seeking for answers. Pupils learn about the world by actively making sense of it themselves, rather than simply having knowledge transmitted to them. Although he did not use the term 'enquiry' in his writings, many of the foundational ideas underpinning enquiry approaches can be attributed to the work of John Dewey (see Pike, 2013 and Pike, 2016). He argued that learning was an active rather than a passive process where children learn by doing and by interacting, and that tasks should as far as possible be challenging and be related to the pupils' real-life experiences. One of Dewey's fundamental ideas is that children and their interests should be the starting point for learning. Because of this, enquiries should be extensions of what the pupils already know, building on and making connections with prior learning. The skilful teacher ensures that this takes place, capitalising on what the children bring to their work.

> Children are never too young to start thinking about why things happen, or to offer their ideas about what might or should happen in the future. Catling and Willy, 2018, p. 109

However, in the context of primary geography, Catling and Willy (2018) went on to state that the application of enquiry and investigation is lacking in much teaching, which tends to use limited information and secondary sources. They advocated recasting approaches to teaching to involve enquiry-based approaches more fully or entirely.

Definitions of EBL

Definitions vary, but at its core EBL has a strong focus on pupils asking questions, on purposeful talk, working together, selecting and interpreting sources, on collecting information, and on interpreting and analysing what they find to come to conclusions and find answers to the question(s) asked (Grigg and Hughes, 2013; Harlen, 2014; Pike, 2016). Martin (2006, p.9) stated that geographical enquiry occurs when: *'… children are actively engaged in the creation of personal and shared meanings about the world, rather than being passive recipients of knowledge that has been created or selected by the teacher'.* Enquiry is about developing understanding, not simply finding information to answer questions. As long ago as the 1930s, the Hadow Report (1931) famously stated that: '… *the curriculum should be thought of in terms of activity and experience rather than of facts to be stored*' (p.93). Similarly, Jerome Bruner argued that: '*Education at its best is based on enquiry and is not just about turning learners into 'little living libraries'* (Bruner, 1966, p. 66). More recently, Vickery (2014) suggested that all children are born with a gift for learning, and have a natural curiosity and a drive to find things out for themselves. She stated that if this is true then the task of teachers is to recreate that sense of curiosity for their pupils in their learning. EBL is a learner-centred approach that emphasises how learning is driven by a process of enquiry owned by the student. Rather than established facts being presented, questions or problems are posed. The

most effective enquiries are those where pupils are intrinsically motivated to explore issues that they find personally relevant (Bacon and Matthews, 2014). Students who are involved in enquiry will be developing essential skills and qualities for learning. An active approach to learning is promoted, encouraging pupils to ask questions about real issues, to search for answers using a wide range of skills and information and to think critically about issues rather than accept passively the conclusions, research and opinion of others (Davidson, 2006). Scenarios for EBL are often created on the basis that they are sufficiently open-ended for there to be multiple and different responses.

> *Enquiry-based learning … is not only about focussing on the relatively low-status activities of the process of knowledge acquisition… it should facilitate the development of deeper understandings, the ability to apply and analyse information, and to synthesise and evaluate. All of these more complex and advanced levels of cognitive activity are seen as key in helping the pupil to reach higher levels of achievement.* Pickford *et al*. 2013: p. 16

As well as building their understanding, when engaged in EBL work the pupils are developing their critical thinking and communication competencies, and also learning how to work both independently and collaboratively (Harlen, 2014; Short, 2009). In this way enquiry is enhanced as pupils take part as one of a community of learners, each learning from the other in social interaction. Teachers help to build a community of enquiry in the classroom in many ways: through small group work; by encouraging learners to share with each other; and by providing equal opportunities to participate in discussion (Austin, 2019; Pike, 2016). Murdoch (2015) described enquiry as something that is not just a process or methodology; rather it is a way of being.

For the purpose of this research, enquiry is understood as the ways in which curious learners actively and seriously engage with the social and physical environment in an effort to make sense of the world, and the consequent reflection on the connections between the experiences encountered and the information gathered, leading to thoughtful action (Austin *et al*. 2020). When primary school pupils engage in this type of work, their excitement and wonderment can be captured, and the learners' questions can be addressed through rigorous hands-on investigation, leading to sometimes tentative answers.

Types of Enquiry Approach

Commonly, there are two different understandings of the term 'enquiry' as used in the primary classroom. Firstly, it can involve a discrete piece of work that uses enquiry skills as the pupils develop their knowledge and understanding of the content. This is often quite substantial and based on first hand data. Alternatively, enquiry can be seen as an approach to learning that expects pupils to enquire actively into questions, issues and problems. An enquiry can, but does not have to be, a big project. Within enquiry all types of activities can occur as the 'enquiry approach' can infiltrate all aspects of pupils' work. It does not have to be a full unit of work; a small enquiry can be carried out in one lesson. It might not be a first-hand investigation; it can use secondary data, including textbooks. It may take the form of a closed-ended search, by which specific answers are discovered for specific questions. Alternatively, it may take the form of an open-ended enquiry where there are no definite answers. Within such enquiries, there will be occasions where concepts are explained to pupils. It can vary in geographical scale from an international or global topic to a local matter. It can range from smaller enquiries within larger topics to work on controversial issues or environmental concerns within the local area. A good example of a local, small-scale enquiry was described by Tanner (1997), who reported on the work of a Year 5 class (ages 9-10) in Leeds. A plot of land near the school containing waste ground and dilapidated buildings was visited by the class. It was up for sale and 'ripe for development'. The children looked at maps to identify why the location might be advantageous for a developer. The enquiry question that was asked was: 'What would we as a class like to see built on the vacant land?' Designs for community facilities and play parks were drawn up. Letters were written to estate agents and the Leeds Development Agency, and great excitement ensued when formally headed reply letters were received. Similarly, Schlemper, Athreya, Czajkowski,

Stewart and Shetty (2019) described student-led, enquiry-based geography lessons on a number of local issues including crime, housing, and youth employment opportunities, using digital mapping to identify patterns and suggest solutions. What was important is that the pupils were actively investigating, steered in this case by a real-life local issue and by an overarching enquiry question. Using an enquiry approach when teaching about local and/or topical issues can be especially effective in maximising pupil motivation and interest.

Benefits and Challenges of EBL

The benefits for pupils of using enquiry approaches in the classroom are claimed to include increased interest and motivation and a feeling for pupils that they are valued and treated as being responsible. This sense of 'ownership' is based on a perception of greater involvement in an enquiry topic than in 'normal' class work (Greenwood, 2019a). In addition, EBL approaches can provide both natural differentiation and challenge. The focus is more on learning rather than teaching, and on the process, not just the product, as various skills are developed (Wolk, 2008).

Roberts (2013) set out some of the challenges for pupils and teachers of using EBL approaches in geography teaching. Firstly, she argued that pupils need to be aware of the key enquiry questions framing a unit of work and that as far as possible they need to have the opportunity to examine source material rather than someone else's thinking. In doing so, they are encouraged to develop a critical approach to the value of any material used. Secondly, she suggested that EBL makes demands on teachers' subject knowledge and their pedagogical knowledge. Strong subject knowledge allows teachers to identify key questions, structure enquiry work in order to help pupils develop an understanding of key concepts, evaluate a variety of sources, suggest additional ideas, and answer pupils' questions and assess their work. Roberts (2003) suggested that one significant way in which enquiry work can vary is the extent to which teachers or students control the learning. She adapted a framework devised by Barnes *et al*. (1987) (Roberts, 2009) containing the categories 'Closed', 'Framed' and 'Negotiated', indicating the degree of teacher or pupil control in an enquiry (Fig. 1). She encouraged teachers to create a 'need to know', to allow the pupils to gather data as evidence, to make sense of the information for themselves and to reflect on their learning by asking critical questions about the topic and about how the enquiry was conducted. At the Closed end of the framework the questions to be asked, resources used, skills to be developed and conclusions to be reached are controlled by the teacher. Roberts wondered if this style of teaching could properly be called an 'enquiry' at all since the students would be 'passengers on some sort of enquiry journey' (Roberts, 2003, p. 34). In the Framed category, the teacher controls the overall framework but there is much more scope for the pupils to ask some of their own questions and reach their own conclusions. In the Negotiated section, control is largely handed over to the pupils. The teacher plays much more of a supporting role and the pupils have more opportunity to develop the complete range of enquiry skills. It is likely that most primary school teachers would see this as a step too far for their relatively young pupils and might attempt to develop their class's independence by carrying out enquiry work in the compromise 'Framed' fashion. Roberts suggested that one of the values of this kind of framework is in making teachers more reflective about the professional judgements that they make in planning enquiry work.

ASPECT OF ENQUIRY	CATEGORY OF ENQUIRY		
	CLOSED	FRAMED	NEGOTIATED
CONTENT	Focus of enquiry chosen by teacher.	Focus of enquiry chosen by pupils within theme. (E.g. topic is 'Volcanoes' but pupils chose which ones to study.)	Pupils choose focus of enquiry.
QUESTIONS	Enquiry questions and sub-questions chosen by teacher.	Teacher devises activities to encourage pupils to identify questions or sub-questions.	Pupils devise questions and plan how to investigate them.
DATA	All data chosen by teacher; data presented as authoritative evidence.	Teacher provides variety of resources from which pupils select data using explicit criteria. Pupils encouraged to question data.	Pupils search for sources of data and select relevant data. Pupils are encouraged to be critical of data.
MAKING SENSE OF DATA	Activities devised by teacher to achieve pre-determined objectives. Pupils follow instructions.	Pupils introduced to different techniques and learn to use them effectively.	Pupils choose their own methods of interpretation and analysis and presentation. Pupils reach their own conclusions and make their own judgements.
SUMMARY	The teacher controls the construction of knowledge by making all decisions about data, activities and conclusions.	Teacher inducts pupils into the ways in which knowledge is constructed. Pupils are made aware of choices and are encouraged to be critical.	Pupils are enabled, with teacher guidance, to investigate questions of interest to themselves and to be able to evaluate their investigation critically.

Largely teacher-controlled   Largely pupil-controlled

Teacher and Pupil Roles in EBL

Enquiry-based learning, while being one of the most effective and beneficial forms of learning, is also one of the most complex and demanding types of work for teachers to engage in (Kidman and Casinader, 2017). When using an enquiry approach, the teacher's role needs to change in order to maximise pupil development and allow progression, moving the focus from the teacher to the child (Dolan, 2020; Catling, 2003). Catling described how teachers can, firstly, *enable* enquiry by using children's innate curiosity whereby they develop a sense of focus for ordering their enquiries as they are encouraged to ask their own questions. Secondly, teachers can *enhance* the enquiry by allowing an increased level of pupil responsibility to question and investigate. Finally, the teacher can *empower* the enquiry; the children are encouraged to take direct responsibility for identifying, using and evaluating their own enquiry questions and investigations while the teacher continues to act as facilitator. As an example of 'empowering', in the context of developing pupils' abilities to use Geographical Information Systems (GIS) data, Pike (2020a) suggested that the next step for more participatory geographical learning would be to develop opportunities for children to make informed decisions and communicate their perspectives to relevant stakeholders such as local planners and councillors.

One of the main aims of EBL work is to develop the pupils' independence and resilience. Green *et al.* (2013) provided an example of an enquiry approach used with an upper primary class in a small

school in Ireland. The pupils reported how, in their local area enquiry, they were given time and space to lead much of the work themselves, making decisions about how to progress the work, how to collect the data they needed, and how to write up the findings and present them to parents. One conclusion from the pupils was: '*We remember a lot of what we did … because we had time to work things out: it made more of an impression on us*' (p.29).

The term 'pupil voice' embraces strategies that offer pupils a role in decision-making within their class work (Greenwood, 2019b). KWL grids are an example of this in action, and can be especially useful at the start of a class enquiry. The pupils are asked to record what they already know (K) about a topic and what they want (W) to know about it. At the end of the topic they can discuss what they have learned (L). In this way an enquiry mind-set within an 'enquiry classroom' can be developed as a 'safe' place as well as a stimulating one where questions are not just welcomed but valued. Greenwood (2019b) described some of the benefits of this kind of approach, as discussed by teachers, teacher education students and primary school pupils. He found that pupils' ability to generate questions improved, and their sense of enjoyment and of being valued developed as their involvement, engagement, motivation and 'ownership' of the topic or enquiry being studied increased. An added bonus reported was enhanced teacher-pupil relationships. However not all teachers share this optimistic viewpoint and some fear handing over control to their students (Greenwood, 2019b; Waldron, et al., 2009). In addition, pupils may also see the use of KWL charts as tokenistic if their use is not embedded throughout the enquiry process. Alexander (2010) reported that some teachers see 'pupil voice' approaches as yet another erosion of their authority in the classroom, but he countered this attitude by stating: '*Suggesting that children should have a voice does not negate the importance of the teacher voice*' (p.154).

Group Work and End Products in EBL Work

EBL has long been seen as a perfect vehicle for group work, with its benefits of collaborative discussion, task-focussed talk, sharing knowledge, understanding and ideas and group problem-solving (Hoodless *et al*., 2009). In the Northern Ireland Curriculum, 'Thinking Skills and Personal Capabilities' (TSPCs) are a core, statutory element of the curriculum. Along with 'Being Creative' and 'Thinking Problem-Solving and Decision-Making', one of the TSPCs is 'Working with Others' which stresses being collaborative, listening actively and respecting the views and opinions of others – all vital elements of group enquiry work. Successful work of this kind requires careful planning and preparation in terms of deciding how groups and resources are organised as well as clear instructions and guidance about roles within the groups.

Enquiry is not simply about finding information to answer questions; it is about developing understanding. In order to do this students need to do something with the information they have gathered. They should be involved in examining the data they have found, attempting to relate it to what they already know. This being so, decisions need to be taken about what to do at the end of an enquiry activity or unit. Suggestions include: a group presentation with pictures or posters or the use of ICT presentation programs; a 'hot seating' or 'ask an expert' activity, where group members are quizzed by the rest of the class; the creation of a 'museum' of historical artefacts; writing newspaper reports or the filming of a pretend TV news report, perhaps using a green screen background app; recording a podcast, perhaps with 'vox pop' interviews; role plays or 'freeze-frame' presentations; the creation of a publicity leaflet; or a class debate.

EBL in the NI and ROI Curricula

The Northern Ireland Curriculum document does not make explicit mention of 'enquiry' methods; however phrases describing how pupils should be enabled to explore and investigate are used. In the Area of Learning that includes geography, history and science and technology – 'The World Around Us' (WAU) – teachers are encouraged to build on children's previous experiences of the world in which they live, including '…*asking questions about why things happen'* (CCEA, 2007, p. 85).

A report by the Schools Inspectorate in Northern Ireland (ETI, 2014) into the implementation of the WAU in primary schools emphasised the importance of enquiry-based learning. The inspectors reported that in 'Very Good' or 'Outstanding' lessons the teachers '…*facilitate the children in learning which is enquiry-based, active and flexible*' (p.18). They went on to state that: *'Children in these lessons are… asking pertinent questions and trying to find out for themselves'* (p. 19*)*. In contrast, they found that learning and teaching were less effective when there is a lack of genuine enquiry and the lesson contains low-level, predictable activities. They recommended that schools should make WAU, particularly the science and technology strand, more investigative and enquiry-based and emphasise its place in everyday life. Research in schools in the Republic of Ireland (Pike, 2016) has highlighted the overwhelmingly positive responses to EBL in classrooms. The ROI National Council for Curriculum Assessment (NCCA) emphasises the importance of an enquiry approach to learning, recognising that a child's sense of wonder and natural curiosity is a primary motivator for learning, and also emphasising that the child should be an active agent in his or her learning (NCCA, 1999). The current research was designed to gather the opinions of teacher education students from both jurisdictions.

Methods

For the purposes of this paper, the results from two research methods will be analysed: student surveys and student group interviews.

Firstly, a convenience sample of students completed brief initial survey questionnaires relating to their views and experiences of EBL. These questionnaires were devised collaboratively by the research group and delivered to students in a selection of Primary ITE modules in the three participating institutions: Marino Institute of Education (MIE) and Dublin City University (DCU (both located in Dublin), and Stranmillis University College (SUC), located in Belfast. The questionnaires contained a mixture of closed, mostly Likert Scale type questions, along with some open questions. In total 127 survey responses were received. All responses were anonymised and quantitative analysis was carried out using SPSS.

Secondly, three semi-structured group interviews were conducted in person with volunteer student participants in each of the three institutional settings. Groups ranged in size from 4-7 participants, and interviews were generally about 60 minutes in duration. In each case interviews were carried out by members of the research team who were not involved in teaching at those institutions. Audio recordings were made and transcribed prior to coding and analysis. The constant comparative method was used for data analysis of the group interviews (Marshall and Rossman, 2010). Transcripts were initially read independently and coded by each member of the research team. Collectively, the researchers then met to identify dominant and recurrent themes, and these were combined to constitute categories of meaning and then re-evaluated. Findings are presented in line with conceptual themes from the literature review and data collection instruments.

The research design was approved by the Research Ethics Committees at all three of the participating institutions. All of the students who participated in the research gave informed consent prior to taking part in the surveys or group interviews, retaining the right to withdraw from the study at any time. All data was anonymised and stored in secure files.

Results

Student Surveys

In total 127 primary teacher education students in three Colleges of Education in Northern Ireland (NI) and the Republic of Ireland (ROI) were surveyed for their views and experiences of EBL. All of the students were in Year 2 (76 students, 60%) or Year 3 (51 students, 40%) of their programmes. Most

of the students (94, or 74%) were studying in the ROI, with 33 students (26%) studying in NI, reflecting the balance of research partners in the project. Just over 18% of the students were male and just under 82% were female, broadly reflecting the gender balance at the three institutions. In all of the responses to the questions discussed below, none of the variations in answers given reached statistical significance when analysed according to gender, location in ROI / NI or Year of study.

a. Experience of EBL in School

The students were asked to indicate at what stage in their education they first learned what EBL was. For most students (86.6%), EBL was first identified as such during their college course. There are two possible explanations for this: either they did not encounter EBL in primary or secondary school, or the EBL they did encounter was not explicitly identified as such until they learned about it in their ITE programme.

b. Experience of EBL on School Placement

When asked to consider EBL in the context of their school placements, many of the students were able to give examples of activities involving EBL which they had either taught or observed. In this context they used words such as pupil 'research', 'investigations' and 'discovery', understanding that it was the element of pupils being pro-active which was most indicative of EBL work. The examples they gave were from science-, history- or geography-based classes, as well as from work within a range of other subjects. They included: exploring electricity through enquiry; children creating and implementing a school survey; an enquiry about environmental change; using enquiry activities in maths to learn about weight; exploring the life of Henry Ford; and an enquiry into local landfill and recycling. Most were very positive about the impact of EBL on pupil learning: 91.2% of the students thought that it helped children to understand concepts. 96% strongly agreed or agreed that EBL was a good way to learn science, and the equivalent figure for learning geography was 93.6%. The figure was lower for history, but even here over three quarters of students (76.6%) thought EBL was a good way of approaching the subject.

c. EBL – Benefits and Challenges

Many of the students did recognise that EBL can be challenging. Just over a quarter (26.6%) agreed or strongly agreed that EBL is difficult to implement in the classroom, although 34.1% disagreed or strongly disagreed with this statement. However, for most students, the value of EBL outweighed the challenge - only 13% of students agreed or strongly agreed that EBL takes too much time to do in classrooms, with 53.7% disagreeing or strongly disagreeing with this statement.

Focus Group Interviews

Three focus group interviews were carried out, one in each of the three ITE institutions. This paper reports on the discussions in relation to the following issues: the students' understanding of the definition and characteristics of EBL; reflection on their own experiences of EBL in primary and secondary schools; their experiences while observing and teaching using EBL on school placement; and their ideas about the benefits and challenges posed by EBL for both teachers and pupils.

a. Definitions and Characteristics of EBL

There was a high degree of commonality in the three groups' understandings of how EBL can be defined. Frequently used words and phrases were 'discovery', 'children asking questions' and children's 'choice', 'control' or 'decisions'. In addition, individuals mentioned that while teachers would most likely choose the overall topic to be studied and pose the main problem or question, children were encouraged to 'figure things out for themselves'. Others noted the ideas of 'following children's interests', 'curiosity' and 'child-led /child-centred work'. One student simply said 'having an enquiring attitude'. The importance of 'group work' and 'children learning from each other' was emphasised, as were 'active learning', 'pupil participation', 'hands-on learning', 'engagement' and

'problem-solving'. The students in one of the focus groups were unsure about the distinction between active learning and enquiry-based learning:

> *Asking questions, is that enough to categorise it as enquiry or … is that just active learning?*
> (Student, MIE)

Two of the groups specifically noted how activating children's prior knowledge in class discussions and questioning could stimulate pupil enquiries, and one group described the effectiveness of using KWL grids (Greenwood, 2019b) as part of this kind of exercise. Two of the groups discussed the importance of devising activities where children presented their findings to the rest of the class – 'a showcase element'.

b. Students' Primary and Secondary School Experience of EBL

Various examples were listed of learning that the students participated in when they were in primary school but would now, in hindsight, describe as EBL. Examples cited were: a country project looking at a country of their choice and including their own ideas about content; group experiments and investigations such as growing sunflowers or cress or making lighthouses including electrical circuits, or water evaporation experiments; nature walks where leaves and fruit were collected and identified; and individuals' family tree or family history projects. Discussing this last example, one student explained:

> *You were encouraged to enquire about your own history. You know, where you'd be looking for primary and secondary resources and then present on the project.* (Student, MIE)

One of the students described what she called a '*personally motivated project*':

> *I remember, I think it was maybe fourth class, we did a personally motivated project. So everyone in the class was given a week, and in that week you were allowed do a project on anything. I remember it was at Halloween and I did mine on witches.* (Student, MIE)

Another MIE student had strong, positive memories of this kind of 'free choice' project which she carried out in primary school:

> *I remember us getting to do our own projects and I still remember it - I did mine on 'Manatees'! I don't know why. And I remember my dad got me a little jewellery box, with a manatee on it … I still have it because I must have gone manatee crazy!* (MIE)

One student made a general point about this kind of enquiry:

> *I felt that's where the freedom of enquiry was in primary school - when you were just sent to do a project and then you worked in a group, and then you went and researched it.* (Student, DCU)

A student from another group thought that:

> *You were motivated by that … internally, because it was your own work and you were going to present on it you took ownership of it so you had a bit more pride in that work than maybe say your copybook that no one was going to look at or your homework.* (Student, MIE)

Another student remembered one teacher's flexible attitude to a question which she, the student, had asked:

> *In fifth or sixth class we did a topic about water and I asked the question: 'if I left the water beside the window would it evaporate?' and I remember my teacher saying, 'Okay, well go get a dish and fill it up with water'. That was I think a personal form of … an enquiry based question and she said 'Okay, we'll figure it out'.* (Student, MIE)

However two students in the NI group said that they had experienced not much or no work which they would now describe as EBL when in primary school. Many of the students recalled examples of EBL-type work in their secondary education. For example, geography fieldwork involving some element of enquiry was mentioned, but it was often highly structured by the teacher. Similarly, history projects were remembered in which the choice of topic was allowed but the structure was set by the teacher. Two students wondered if this kind of work was enquiry at all:

> *We were told what to do …. I don't know if that counts as enquiry.* (Student, DCU)

We were given notes and we were told and that was it. (Student, DCU)

Another student remembered that the members of her A-Level French class had each to choose a region of France to research and report on, and she recalled how her teacher commented that the element of choice had created greater pupil engagement with the work produced than she had previously recalled when this choice was not allowed. Some choice of options within a course was noted by one student, but this was rare in most students' experience. Two students in one of the focus groups said that they had never had any choice about anything in secondary school. The others agreed that there had been a big focus on examination results and associated learning off of material for those exams, and that there had been less practical work than in primary school:

> *In secondary school there's a big focus on getting exam results and the teacher has deadlines, so maybe EBL takes a back seat … [there's] more focus on passing exams.* (Student, SUC)

c. Experience of Observing and Using EBL on School Placement

Students were asked to reflect on EBL that they observed being used by the class teacher, or others within the school, and in their own planning and teaching. Generally the students had positive recollections about when EBL was used, which was mostly at senior primary level. A number of examples of observing EBL approaches during school placements were cited, for example: independent LEGO programming; Young Scientists activities; history research using iPads; individual and group research/ enquiry during World Around Us topics on World War 2 and while studying volcanoes; and report writing in English. The students also seemed to recognise the greater ownership the children had in these lessons. For example:

> To get them started they were following instructions, but then there were other times when they had to use their own ideas. (Student, DCU)

And:

> It was really child-led. Teachers didn't get involved at all really… They [the pupils] were so engrossed in the work. (Student, DCU)

Some students in the NI focus group reported less frequent observations of the use of EBL approaches in upper primary than in lower primary, surmising that the Transfer Test in their last year of primary school produced time pressures for upper primary teachers, and EBL approaches are perceived as taking more time. In contrast one of the others in the group had noted the opposite, reporting that teachers with whom she had spoken said that EBL work and providing choice in activities and investigations were too advanced for younger children. However, forms of investigation and enquiry during structured play in lower primary classes were highlighted. The students also listed examples of when they themselves had taught using EBL approaches. These included: using a KWL grid at the start of a new topic, asking for predictions; a P1 topic on 'Water' with lots of experiments and predictions; an experiment on observing melting ice during a topic on 'The Titanic'; a country project; and using different historical sources and artefacts during a history topic. One student said:

> …. the more I think about this ….. I realise how much you do enquiry, because whenever I went in to do those lessons about water …. like the music activity or filtering the water … I didn't go into them thinking this is enquiry-based learning. (Student, SUC)

Another added:

> It's easy to integrate EBL without knowing you're doing it. (Student, SUC).

d. Benefits of EBL for Teachers

Two of the focus groups specifically mentioned that teachers should find using EBL approaches an enjoyable way to teach. The teacher's role has to change and the teacher should appreciate being a facilitator, 'letting go' a little, going with pupil interests and providing choice:

> *I think the role of the teacher changes as well in enquiry based learning. The teacher is more like a facilitator rather than standing at the front of the classroom. I think children enjoy that and a*

teacher may be involved in joining with one of the groups so it's more fun for the teacher as well. (Student, SUC)

One student thought that teachers would get more from the pupils when using EBL, especially when the work is done outdoors:

I also think you'll get a lot more out of the children when you do enquiry and especially if you take them outside of the classroom - they become totally different and they don't see you as being that strict teacher - you're part of the group and they open up and they're not afraid to get it wrong so they're more likely to contribute…. (Student, SUC)

Another student in the group agreed, saying that the teachers in the school thought she was 'crazy' for planning to take her class outside for an outdoor enquiry when a College tutor was due to observe her lesson. She found that the pupils behaved really well because they were excited about doing something which was different and interesting.

e. Challenges of EBL for Teachers

In all three of the focus groups the issue of time was noted as a challenge raised by using EBL approaches in the classroom:

… there's a lot of skills they're learning but I think that sometimes teachers think 'Oh that's going to take all day' … even though they can split it all up over the week… (Student, SUC)

I don't think it's possible to do just enquiry-based all the time … there is a balance between enquiry and then …. teaching them what they have to do. (Student, MIE)

I did 'Soil' on my last placement, with 3rd Class, and I would have loved to have got them going out and collecting their own soil samples and everything, but you just don't have time to do that, with the hour slot that you have for geography. (DCU)

Students in two of the focus groups made contradictory comments about the issue of time for EBL approaches when on school placement. One student from DCU complained that:

… it's not your school, it's not your class, you can't ask for too much and you can't ask for too much time either. Whereas if you had a class for the whole year you could devote a bit more time to it, because it's worth it. (Student, DCU)

In contrast, one of the Stranmillis students explained how she had used lots of enquiry and experiments in a P5 topic on Water. She said:

I had more time and less pressure than the teacher. (Student, SUC)

Rather than illustrating ROI/NI differences in approach, this kind of discrepancy may be because of differing student perceptions or varieties in school or teacher attitudes.

In addition, issues of resources, facilities and logistical challenges were noted:

… there's a lot of prep and a lot of resourcing … bringing stuff in. There's so much learning goes on with enquiry-based [learning] but there are challenges there, logistical challenges for teachers. It's brilliant when it works. But it requires time, preparation and money to really facilitate a good EBL lesson. (MIE)

Difficulties of classroom management were also identified as potential problems, especially where class sizes are large. In addition, all three groups mentioned challenges associated with assessment – both with devising effective assessment of EBL work and, when the activities have been active and hands-on rather than paper-based, with having evidence that work has been done to show, for example, to other staff, parents or inspectors:

I find a challenge is with the assessment [of EBL work] - *to assess what they actually know. If you want to do it enquiry-based, you might say 'Ok we're finished learning about The Famine', but what can they actually tell you about The Famine?* (Student DCU)

I suppose teachers need results and … I think for enquiry-based [learning] it's hard to have something to show for it. (Student, MIE)

> *… the one problem I find is to strike that balance between recording and still keeping it playful and focussed on enquiry because I think that the challenge for … actual qualified teachers is - what do we actually have to show for the end of this? (Student, SUC)*

The SUC group discussed how ICT can help with the recording issue, for example as photographs of the children working and perhaps the items they have created can be taken, and apps such as Seesaw and Pic Collage have been found to be useful for storage and display of this evidence. One of them stated:

> *… I think that the benefits definitely outweigh any of the challenges. (Student, SUC)*

f. Benefits of EBL for Pupils

The three groups of students suggested a number of potential benefits of EBL for pupils – for example that it is more enjoyable and more stimulating than other forms of school work, increasing pupil interest and motivation, and that it is often more memorable. An MIE student spoke about pupil retention of information:

> *I found that they retain information more if they've been given the opportunity to do hands on learning which is enquiry-based. (Student, MIE)*

One student suggested that much more discussion is developed among the children when using EBL, and they all agreed that they could remember more from primary school lessons when active, enquiry approaches were used than from more 'passive' lessons. One student recalled her own time at primary school:

> *I have retained lots of information from primary school about things that I looked up myself. I did a project on Denmark in fifth and sixth class and I remember … I can tell you everything about Denmark from that project. (Student, MIE)*

Another student from MIE reflected on the idea that many skills can be developed at once and that skills development might often be more important in the long term than the retention of subject-specific information:

> *But throughout school they're learning those skills, which is more important. So, it's in those lessons that they're learning those skills that they're going to keep building on, and perhaps it's more important to have those skills to find out more information than to actually have the information itself. (MIE)*

g. Challenges of EBL for Pupils

All of the groups noted that active, enquiry-led group or individual activities were difficult for some pupils, depending on their personalities and perhaps their specific learning needs. While some pupils thrive when allowed some independence, others struggle with attention and engagement in rather more 'free' circumstances. In addition, some pupils find it difficult to engage in open-ended enquiries where there is no 'right answer':

> *I've seen a few kids and they'd be very bright academically, but I know two in particular who don't like research projects in a way because there's no right answer. (MIE)*

Discussion

The aspect of the wider research project reported here aimed to uncover the students' understanding of what EBL is and their opinions about EBL as an educational approach, as well as discovering their experiences of EBL in their own education and during their school placements so far.

In both the surveys and the focus group discussions, the students were clear that EBL is characterised by a high degree of pupil choice and decision-making. It was agreed that child-led or child-centred work, active learning and active participation were important elements of EBL, but there was an absence of reference in the students' discussions to the possibility of pupils 'taking action' as a result of their enquiries – the possibility of 'empowering' pupils, as discussed by Catling (2003). It is suggested that this higher level of EBL work is something to which the students may not have been exposed during their school experience to date. Such an omission may indicate that this potential phase of the enquiry process is less well-recognised and understood by teachers, or that the students' experience to date on placement has not been sufficient for them to become familiar with this aspect of enquiry. Teachers and student teachers can be introduced to examples of 'easy' ways in which this kind of pupil agency, 'taking action' activity may be carried out. The example cited earlier involving a class from Leeds writing to local representatives about possible uses of an area of derelict land near their school (Tanner, 1997) is not a difficult activity to organise, and in that case proved to be a very stimulating and engaging 'climax' activity. Similarly, pupil-led local enquiries using GIS, as described by Pike (2020) might be attempted.

It appears that the phrase 'Enquiry-Based-Learning' was not one which was widely used when the students who took part in this project were at school – approximately ten years ago in the case of primary school and approximately three or four years ago in the case of secondary school. However, having learned about EBL approaches in college, many, but not all, of the students were able to reflect on activities during their time in primary school which in hindsight they identified as EBL activities. These involved work within a variety of subjects or areas of learning and ranged from class or group projects, experiments and investigations, to individual work. Some of these 'free choice' topics were 'personally motivated projects' which still produced strong, positive memories many years later. Recollections about EBL work in secondary school were also varied, but most involved the class teacher structuring the work fairly tightly, for example within geography fieldwork or history projects. In this context, discussions during the focus group interviews centred on to what extent pupils had choice in activities and investigations and to what extent teachers dictated the structure and procedures in pupil work; the students wondered if, when there was a lot of teacher direction and little pupil choice, an activity could rightly be called EBL at all. This reflects the questions raised by Roberts (2003) concerning the 'Closed' end of her participation framework where teachers maintain a high degree of control and pupils are merely 'passengers'.

The majority of the students were able to give examples of EBL activities which they had either observed being utilised or which they had led themselves during their college teaching practice blocks. Words such as pupil 'research', 'investigations' and 'discovery' were frequently used, and the students displayed a clear understanding that it was the element of pupils being pro-active which was most indicative of EBL work, echoing phrases from the ROI curriculum (NCCA, 1999) and a recent Inspectorate report in NI (ETI, 2014). In this regard, the students were clearly demonstrating their understanding of the importance of 'enabling' pupil enquiry. However a number of their comments, for example those about the need for the teacher's role to change when leading EBL activities by 'letting go', shows some understanding of the need to 'enhance' the level of pupil responsibility to question and investigate (Catling, 2003). Examples were cited from across the curriculum, and most students were very positive about the impact of EBL on pupil learning. In common with conclusions by Greenwood (2019b) and Waldron, et al. (2009), the students' responses in the surveys and the focus groups communicated that they had seen improvements in pupils' understanding of concepts and retention of knowledge as well as in their motivation for and 'ownership' of projects where enquiry was at the fore. Discussions on whether EBL work was carried out more frequently and was more useful for the pupils in either upper or lower primary classes proved somewhat divisive, with arguments being made on both sides.

The students displayed an element of realism about the challenges which EBL work can produce, both in terms of practical implementation (resources, facilities, classroom management and

assessment) and also the time needed to carry out this type of work effectively. Some spoke during the focus groups of the need for teachers to find a balance between EBL work and more directive teaching. However, for most students, the value of EBL outweighed its challenges. Some spoke of increased teacher enjoyment, realising that the teacher role may have to change slightly during EBL lessons, with teachers sometimes having to learn to 'let go' (Catling, 2013). However most felt that improvements in pupil stimulation, engagement and enjoyment could be observed, as well as development in pupils' ability to discuss issues, along with the development of their research, investigative and presentation skills. It would appear that the students who took part in this research recognise the importance of EBL at primary level, and, despite understanding the challenges that it involves, have not been put off from using EBL approaches in their future teaching careers.

The research process was enriched by drawing our students into the project, hearing the 'student voice' and perspective. It is heartening that this study has shown that our student teachers appreciate the effectiveness of EBL approaches as they look forward to encouraging the children in their future classes to progress as learners.

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