Many teachers, schools, parents and community organisations feel that ‘standards’ education is not serving us well. It has proved ineffective at preparing many students for work, higher education and general wellbeing, nor does it keep students engaged and intrinsically motivated, capable of sustaining interest in education and learning. There is a suppressed desire to transform educational outcomes, and enquiry based learning (EBL) and project based learning (PBL) are the prime candidates for achieving such a goal.

EBL is education that is driven by curiosity, questions and problem solving, with the capacity to produce results that are equal to or better than standard outcomes. This new text provides a critical examination of EBL and PBL by exploring a wide range of international exemplars and considering the benefits, barriers and contradictions generated by the efforts of teachers and schools. Focusing on analytical frameworks and socio-cultural theory, areas covered include:

- enquiry and society
- what EPBL is
- learning through enquiry
- challenges for schools and teachers
- student outcomes and assessment
- teacher learning
- curriculum development.

*Enquiry and Project Based Learning* offers analytical frameworks and practical guidance for students, teachers and all those interested in enquiry based learning, as well as presenting a balanced, purposeful and motivating alternative to mainstream educational practice.

**David Leat** is Professor of Curriculum Innovation at Newcastle University, UK, Director of the Research Centre for Learning and Teaching, and Assistant Director of SOLE Central (researching Sugata Mitra’s Self Organised Learning Environments concept). He is also coordinator of the North East EPBL Network.
ENQUIRY AND PROJECT BASED LEARNING

Students, School and Society

Edited by David Leat
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WHY WE NEED ENQUIRY AND PROJECT BASED LEARNING

David Leat

Introduction

In adulthood much of our learning both in work and in social life is conducted through enquiry and solving problems. When we want to know how to do something well – plumb in a washing machine, make lemon drizzle cake, organise a celebration or family party, apply for a government benefit, buy a new bike, make films of our children, grow flowers, get a good tattoo, sew sequins on dresses, buy and sell things on eBay – we do not usually sit in a classroom and take notes, do comprehension exercises and listen to a teacher deliver a lecture. We use a form of everyday enquiry, which is a mixture of finding out a bit from books or the internet, asking a friend, making a start and having a go, getting specialist advice, watching other people, taking stock and evaluating, going back to any of the above to check things out. We also use enquiry modes when we have a problem, although we may be operating under more pressure when we have lost the house keys, double-booked ourselves, gone over our bank overdraft limit, burned a birthday cake or had a row with a member of our immediate family. However, we do not recognise this as enquiry and so people do not recognise enquiry sufficiently as a learning process. This informal and often collaborative and participative process needs wider recognition. There is a need to learn from what and how we learn in places other than schools, without rejecting the best of traditional schooling.

It is worth also listening and watching out for individual testimonies concerning pivotal turning points in people’s lives. In interviews, biographies and conversations it is so common to hear people, both famous and ordinary, refer to people, places and experiences that in some cases were just memorable, and in others a transformation in their view of the world and their place in it. Although some of the people who feature in these narratives were teachers, they were the teachers who made connections, took their students out of the classroom and gave them
learning experiences. It is very rare, I believe, that people refer to being set and reaching numerical targets and grades. We look for meaning in our lives, things that resonate. It is well illustrated in these narratives from a TED blog (2013) that addresses the question of ‘Teachers who inspired us?’ They make clear that teachers who stimulated and respected curiosity and lit the fuse of ongoing projects had profound effects on their students:

Robert Baldwin’s class ‘Essay and Inquiry’. Every day: Walk into class. Sit down. Look at the handout on every desk. Read it. Start writing. Class ends — stop writing. Every day. Except Wednesday, when we’d put the desks in a circle and everyone would read something they’d written. The prompts were everything from simple questions like, ‘What’s your favorite memory of trees?’ to readings from Rachel Carson or W. B. Yeats or Orson Welles. It was a whirlwind of ideas, and the constant writing forced us to wrestle with them, and (tritely but correctly) ourselves. It was like a boot camp in thinking. People I know who took, and loved, that class went on to some of the most amazing careers. Every time we get together, we gush about the quiet, unassuming, force of nature that was Mr Baldwin. He would have hated that last sentence, because the metaphor is strained. But he also taught us to ignore authority, so I’m writing it anyway.

(Ben Lillie, writer/editor)

I took my first painting class my sophomore year of high school and fell in love with it. My teacher, Ms Bowen, told me I could use the art studio whenever I wanted to, and gave me access to all kinds of new paints and canvases. I spent almost every lunch period there for a few years, and regularly stayed in the studio after school ended. One day, Ms Bowen told me that a parent of a student I had painted expressed interest in buying the painting of her daughter. After that first sale, I painted portraits of kids in my school on a commission basis, and continued to do so for the remainder of my high school experience. Thanks to Ms Bowen’s mentorship, I felt empowered to try to make money from something I was passionate about and loved to do.

(Cloe Shasha, TED Projects Coordinator)

By contrast, contemporary schooling in many countries delivers a thin gruel of meaning, causing many less academically successful students to disengage and many successful students to game the system so that they make it to the next fence in the educational steeplechase. We can do better, and this book presents the contribution of enquiry and project based learning (hereafter EPBL) to providing a better education for more young people. In nearly all education systems, we need to give more time and attention to more divergent and participative approaches to learning embedded in the curriculum.
Anna Sfard (1998) drew attention to two metaphors for learning and warned of the dangers of choosing only one. The first metaphor was acquisition, by which she meant how facts and other knowledge entities were received, acquired, constructed, internalised, appropriated, transmitted, attained, developed, accumulated or grasped. The second metaphor is participation, by which she refers to learning through doing in a particular context, indeed learning cannot be considered separately from context, in which one learns by watching, copying, practising and becoming accepted. While there have been critiques and elaborations of the two metaphors (such as Akkerman and van Eijck, 2013), most would recognise that human learning processes and outcomes are more varied than are supposed in the acquisition model and we should heed the warning of the dangers of choosing only one modality of learning. In formal education the acquisition metaphor dominates and it is accompanied by strong classification and framing (Bernstein, 1975). Bernstein, a sociologist working in the second half of the 20th century, was concerned with why ‘working-class’ students did relatively poorly in school. He developed a range of very powerful analytical concepts to explore this phenomenon. In classroom contexts, ‘classification’ refers to the strength of the boundaries separating curriculum subjects, so strong classification describes a curriculum in which subjects are taught with little reference to each other – they are separate domains. Projects reflecting societal issues see subjects as somewhat secondary and in service to the issue. They would be described as having weak classification, where ‘weak’ is not a negative term.

Framing refers to implicit rules that underpin learning contexts. Strong framing reflects classroom relationships in which teachers are very much in control and make all the decisions and thus influence the behaviour of students, who do not assume much responsibility. ‘Realisation’ rules, which are essentially unwritten, determine how pupils should behave, move, speak and write in some detail, through the expectations of the teacher. In weak framing students get some say over the content, direction and pace of learning. Thus many EPBL contexts would be characterised by weak classification and framing, in which students have some degree of agency and teachers assume less authority, but this is not to say that they have no influence on learning. Framing (Bernstein, 1996) is described as a key locus of change in pedagogic settings.

The importance of curriculum is that it is an expression of our vision of future society, not just a document about what pupils are taught in schools. Wiles and Bondi (2007, p. 5) capture some of this sense in the following: ‘We see the curriculum as a desired goal or set of values that can be activated through a development process culminating in experiences for students.’ Schools do shape students’ lives far beyond the exam results that they achieve or indeed fail to achieve. The experience of school can have profound effects on how people see themselves, how they conduct their lives, how they see and interact with others who are different from themselves, how they conceive of the world and therefore how they see their role and responsibility in wider society. School can seed ideas, foster skills and talents, including creativity, find hidden qualities and introduce
people and places to young people that will have a lasting impact. In this way curriculum can help shape the form of society we wish to create for ourselves. In short, school, in the shape of curriculum, can be part of human flourishing. The choices made regarding curriculum are therefore political and informed by values. A curriculum dominated by the acquisition metaphor severely limits the process of human flourishing. One view that underpins this book sees humans as highly social animals (Gergen, 2009) – we achieve and create through cooperation and we become who we are through others, with others and for others, while retaining a core individuality. This is a values position and informed by a view of society and what makes it tick. In this view education should play its part in bringing young people into being truly human members of society. It is a process of becoming (Biesta, 2009) and in this process we are often changed as humans, coming to see the world differently. This is not likely to be achieved if we predominantly choose the acquisition metaphor. The participation metaphor opens up the dimensions of self-efficacy, identity, flourishing and human agency.

It is justifiable to look at complex modern societies and argue that their functioning and achievements in industry, infrastructure, agriculture, public services, technology, medicine, music, theatre, visual arts and sport are quite remarkable. Therefore education and curriculum cannot be doing so badly after all. There is some truth in this argument and, as such, it reinforces the principle that curriculum needs to honour the acquisition metaphor, in the form of good direct subject teaching while making more space for EPBL. There are echoes here of Young and Muller’s (2010) argument about pursuing a Future 2 curriculum, avoiding the worst excesses of a subject dominated Future 1 curriculum and a process-dominated Future 3 curriculum. However, humanity, collectively and individually, faces some very serious challenges: poverty, inequality, injustice, environmental degradation (Ceballos et al., 2015), inter-communal violence, mental health problems and lifestyle diseases such as diabetes, alienation and social segregation. Furthermore, the 21st century does more than offer problems, as there are new opportunities too for young people to take advantage of the new century and its affordances in technology, communication, leisure and travel. Schools in England, the UK generally, and also globally, are working very hard to help students pass examinations, which are the current proxy for education, but it is more difficult to argue that they are doing the best that they can to prepare students for society facing such challenges and possibilities sketched above.

**Understanding enquiry or inquiry?**

In this book ‘enquiry’ is taken to be a generic term for modes of learning driven by questions and curiosity. Curiosity arises when our attention is drawn to something and underpins a motivational desire to know and, as Schmitt and Lahroodi (2008) point out, it encourages tenacity in learning. In the classroom it is often hard to distinguish enquiries from project based learning, as good projects are often driven by curiosity and questions. The *Oxford English Dictionary* defines enquiry as: ‘The
action of seeking ... for truth, knowledge or information concerning something: search, research, investigation, examination.’ It is confusing that both enquiry and inquiry are used with little distinction in meaning. Hutchings (2007) attributes the alternative forms to linguistic history. He argues that ‘enquiry’ reflects the entry into English via Old French, whereas ‘inquiry’ arose when ‘linguist antiquarians’ reconnected the concept with its original Latin root as in inquaerere. Science tends to use the term ‘inquiry’, but this book will generally use ‘enquiry’, as it carries somewhat wider connotations. ‘Inquiry’ will only be used where authors or projects specifically used that term. In use it has become associated with a range of purposes but, as Hutchings asserts, whether it is a relatively open-ended or relatively closed convergent process, the core of enquiry is the question. The genesis of those questions is important and I would stress the significance of student curiosity and creativity as being the source of questions whenever possible. This gives learners the precious gift of some choice and investment in their learning, which is generative of engagement. This, however, does not rule out enquiries that are driven by questions formulated by the teacher or other adult, as students can come to own them.

School in the 21st century: the wrong answer and better answers

For every complex problem there is an answer that is clear, simple, and wrong. (H. L. Mencken)²

Educating young people in the 21st century is a complex problem, because they face some daunting challenges in making successful transitions from school to further or higher education, adulthood, citizenship, democracy and work. The clear and simple answer to this problem in many political systems, notably in English-speaking countries, is a curious mix of market ideology and government control, in which state authorities set ‘standards’ and test whether those standards are being met (Mansell, 2007). The logic is that this will prove that state education provides value for money and encourage competition between schools to ‘drive up standards’. Without such improvement, economic performance will suffer (Organisation for Economic Cooperation and Development [OECD], 2010). This ‘answer’ to the complex problem is – simply – wrong. We are stuck with anachronistic educational systems, as if weighed down and chained to the concrete blocks of an educational model developed in the nineteenth century. Across the globe we have inherited a hybrid of education for gentlemen, and training for industrial workers and artisans, although the mix varies from place to place. If the curriculum is a manifestation of our vision of future citizens and future society, then we are failing in our imagination and in our duty to future generations, because we can do better.

This failure is epitomised in the daily itinerary of many secondary students whose education involves routinely visiting different classrooms for episodes of between 40 and 100 minutes where they sit, predominantly passively, while a well-intentioned and hard-working subject teacher instructs them according to precise
and predetermined learning objectives related to these subjects – a pure expression of the acquisition metaphor. There are precious few connections between these episodes, nothing of substance is produced except work for the teacher to assess, no one visits the room (except to rate the teaching and ‘progress’ in learning) and only rarely would students leave it. Students almost never ask a meaningful question; they only receive knowledge over which they have no control or choice. Connections to daily experience, personal interests or contemporary issues are scarce, although some teachers make a noble effort. Interaction with other students is usually limited to their immediate classroom neighbour. Lingard (2007) has dubbed such a model as *pedagogies of indifference*.

**Performativity**

If the prevalent logic is that schools will improve if an educational market is created, in which those schools will compete for parents and their children on the basis of performance, then the market requires a simple metric through which school performance can be measured and compared. This metric is exam results. This requires an assessment technology that will deliver well-defined metrics. Schools in some countries are therefore now judged by their exam results in a narrow range of subjects. This system has been widely critiqued – and the ‘collateral damage’ articulated, which includes a narrowing of the curriculum, stress induced by high-stakes tests for both teachers and students, teaching to the test and schools learning to ‘game the system’ (Au, 2007; Mansell, 2007; Nichols and Berliner, 2007; Berliner, 2011). In extreme cases gaming mutates into cheating and dishonesty (*Hull Daily Mail*, 2015). As early as 1999, in England, Fielding (p. 286) observed ‘students expressing doubts about the genuineness of their school’s interest in their progress and well-being as persons, as distinct from their contribution to their school’s league table position’. Performativity can sever the vital human connection between students and their school and leave them feeling like pawns in a bigger game.

While there are increasingly high-stakes national tests, the OECD has established an international testing and comparison programme called PISA (Programme of International Student Assessment), organised on a three-year cycle, which has become a big deal for national governments, capturing the attention of media in most of the 70 countries that participate because it is turned into international league tables. PISA tests in reading, mathematics and science are taken by 510,000 15-year-old students, and a smaller number take tests in problem solving and financial literacy. Although there are widespread critiques (Pereyra, Kotthoff & Cowen, 2011; Meyer & Benavot, 2013), PISA is emblematic of much policy thinking. Educational outcomes need to be measured and, if they cannot be, they are too elusive to matter. Thus many educational systems pile their resources into what can be easily measured and educational innovation into reinforcing passive subject learning and the acquisition metaphor. Peter Wilby, writing in the *Guardian* in 2013,³ argues that we should not let PISA dictate our education system:
By focusing on economic imperatives, schools risk losing sight of their roles in nurturing social solidarity, passing on cultural heritage and promoting civic engagement. Might justice, social harmony and a clean environment be just as important for our children’s future as economic prosperity?

Stephen Ball (2003) has captured the essence of the examination of standardised outcomes in the concept of performativity, which generally characterises the increasing tendency of public services to be driven and managed by numerical targets, underpinned by a new managerialism (Clarke, Gewirtz & McLaughlin, 2000). This is a corrosive form of accountability, as schools and teachers are evaluated against their effectiveness in guiding students to reach the public benchmarks of education. These pressures are pervasive and the effects on teachers’ professional lives are easily underestimated. National or state tests become high stakes for teachers and school leaders. Ball et al. (2012) paint a vivid picture of the surveillance exercised by the state and the contradictions experienced by teachers forced to compromise their values. In England, it appears that the performative culture is strongly linked to teachers leaving the profession in unprecedented numbers in 2015, leading to a teacher supply crisis. In the USA, this aspect of collateral damage has been captured vividly by Wayne Au (2011). School improvement becomes distorted, away from improving the life chances of individual students towards improving the key performance targets of schools, even if it means sacrificing the best interests of some students.

Diane Ravitch is one of the most ardent critics of high-stakes testing, despite previously being an advocate of testing and choice. Ravitch served in the administrations of presidents George Bush Senior and Bill Clinton. In her blog, she cites research to show that over decades there is a negative association between test scores and subsequent economic performance. In *The Death and Life of the Great American School System: How Testing and Choice Undermine Education* (Ravitch, 2010), she critiqued the punitive uses of accountability to fire teachers and close schools, as well as replacing public schools with charter schools and relying on superstar teachers. In a 2011 interview, she was trenchant in her views:

We are destroying our education system, blowing it up by these stupid policies. And handing the schools in low-income neighborhoods over to private entrepreneurs does not, in itself, improve them. There’s plenty of evidence by now that the kids in those schools do no better, and it’s simply a way of avoiding the public responsibility to provide good education.

**Engagement and disengagement**

Engagement is a critical concept in education, as it indicates intrinsic motivation and a chance of learning throughout the life course. Lawson and Lawson (2013, p. 433) present it as the ‘conceptual glue that connects student agency (including students’ prior knowledge, experience, and interest at school, home and in the community)
and its ecological influences (peers, family and community) to the organisational structures and cultures of school’. This positions engagement as a socio-cultural phenomenon (see Chapter 4). In other words, engagement connects the student’s life and learning to their home circumstances and the institution of school. If students are not engaged, it suggests that something has become unhinged in this set of relationships so that students’ energy is not directed towards learning in school or out.

In keeping with the argument about the importance of social capital, Stanton-Salazar (2001), quoted in Lawson and Lawson (2013), underlines the significance of school engagement in terms of the multi-stranded relationship between students and teachers when the latter fill other roles in the school and community, such as sports coaches and performing arts leaders. In addition, students develop important life skills as they identify with particular adult role models. This accords with Ungar’s (2012) Social Ecological Theory in which engagement in any sphere is predicted to influence their engagement in other spheres. Early experiences at school, whether success or failure, can herald later levels of engagement, so that students who are unsuccessful start on a downward trajectory which interweaves loss of self-esteem and self-efficacy and a lack of attachment to school. Performative school cultures do not serve to engage students, and yet engagement is paramount to successful education, both in terms of keeping students in school, which is a safer environment than being ‘on the streets’, and in terms of having a better chance of positive educational outcomes. Engagement should be a goal of the curriculum. A recent study on after-school activities in England shows the value that wider educative experiences can have (Chanfreau et al., 2016, p. ii):

For children from economically disadvantaged backgrounds, who have lower take-up of formal out of school activities, school-based clubs offer an accessible, lower cost route for learning experiences outside of the school curriculum with potential benefits for social as well as academic development.

What Did You Do In School Today? is the product of a partnership between the Canadian Education Association, Canadian Council on Learning and some school districts, which used a sample of 32,000 students from 93 schools across 10 school districts in 2007–8 (Willms, Friesen & Milton, 2009). They measured:

- **Social engagement** – a sense of belonging and participation in school life
- **Academic engagement** – participation in the formal requirements of schooling
- **Intellectual engagement** – a serious emotional cognitive investment in learning, using higher order thinking skills (such as analysis and evaluation) to increase understanding, solve complex problems or construct new knowledge

Intellectual engagement falls steadily from Grade 6 to Grade 10, with some recovery in Grades 11 and 12. It is striking that intellectual engagement results are lower than social and academic engagement, which reflects a lack of relevance for students and consequent reduced motivation.
In England a Demos report, *A Stitch in Time* (Sodha & Guglielmi, 2009), paints a disturbing picture of truancy, which results from the extremes of disengagement. They found that truancy increases with age, with 5.6 per cent of secondary school students being persistent truants, missing 20 per cent of the school year, compared with only 1.7 per cent of primary pupils. Truancy is greatest amongst disadvantaged students, with over 8 per cent of those receiving free school meals. The report does admit that part of the cause may be that poorer students may also have responsibility as carers, and this might explain the higher rate of truancy among girls than boys. The danger of truancy is that it can lead to other problematic outcomes, from poor exam results, to antisocial behaviour and alcohol and drug abuse. A further sign of the early warning potential of truancy is that one quarter of 15- to 16-year-old truants disappeared from the public radar within a year, as they were not in education, employment or training (NEET). Demos explicitly make the case that out-of-classroom, experiential and interactive forms of learning are critical to engaging young people, because of the sense of autonomy and control that they derive from such opportunities.

Lawson and Lawson (2013) synthesise research on student engagement and implications for policy and practice from a socio-cultural perspective, which seeks to integrate social and psychological perspectives. They provide a typology of engagement not too dissimilar to the Canadian programme:

- **Affective engagement** – (a) interest, enjoyment, happiness, boredom, and anxiety during school activity; (b) feelings of belonging, identification and relatedness to school peers, teachers and the school.
  Without such attachment, students are less engaged and can drift into inappropriate behaviour, poor attendance and school disciplinary routines.

- **Cognitive engagement** – this reflects how caught up and ‘lost’ in thought and action students are during school activity in pursuit of meaning using metacognition and self-regulating in the process. Lawson and Lawson link cognitive engagement to the appealing concept of ‘flow’ (Csikszentmihalyi, 2013), which combines affective and cognitive engagement, in which students lose track of time.

- **Behavioural engagement** – this is typically reflected in the amount of time students spend ‘on task’, complete homework and assignments and, of course, comply with or infringe school regulations.

The European Commission Education and Training (2014) report does much to highlight the significance of disengagement and early leaving of education and training, the complex reasons that underpin it and some of the most productive routes for addressing the problem. In stark terms, those who are repelled from education are at greater risk of poverty and its attendant disadvantages, such as poor health and unemployment. The point is made that early leaving is superficially an education problem but that its fundamental causes go deeply into wider social, economic and political issues. This mirrors the argument in this book that the
future of EPBL depends critically on how society comes to imagine the purpose of education, and how EPBL can help to shape society and the tensions that confront us.

Statistics in the European Commission report show that those students born abroad, those from disadvantaged backgrounds and males are more likely to leave education early. Generally, students from migrant backgrounds find it harder to access educational resources and opportunities. The likely reasons are language, social and cultural barriers that limit knowledge of educational systems and limited access to learning support, including that from their own families where there may not be a history of participating in extended education. This is not helped by the socio-economic segregation of schools and students being allocated to educational ‘tracks’ at an early age. Successful counter-strategies against disengagement rely heavily on an integrated approach across the range of public services. One of the challenges reported by countries in establishing an effective strategy is, in general terms, ensuring collaboration, but more specifically is encouraging schools to link with outside organisations and agencies. Here is an example of schools being ‘walled off’ from society because they are so consumed by a dominant agenda of standardised testing, which is at its worst in Anglophone countries.

One of the factors identified in reducing early leaving is teachers’ ability to identify individual students’ learning needs. In addition, career guidance is a protective factor and the point is made by the European report that this is effective when part of the curriculum is offered through the work of non-specialist teachers. EPBL provides a context in which not only are teachers putting students in touch with potential careers, beyond those glamorised in the media, but this is also being made possible through a range of people in the wider community. EPBL provides a platform for tackling some causes of disengagement.

**Better answers to engagement**

EPBL can create a very different educational experience, which is illustrated in the examples below. These are not necessarily examples of what any particular school can arrange in the next term, but they should inform practitioners about what is possible through feeding their imagination. The first example demonstrates the principles of *service learning* (Butin, 2010), in which students are enlisted as explainers in a museum. According to Harrison and Clayton (2012, p. 29), service learning ‘positions all participants as simultaneously teachers and learners, servers and served and thereby evokes radically different identities, roles, and responsibilities than those into which most of us have been socialized’.

The examples demonstrate an important societal theme in this book – that the community contains a panoply of resources that can be drawn on to provide more meaningful and effective education. The model of explainers can be adapted to many other contexts and is similar to getting students to take visitors on a tour of their school, but with the twist that they are explaining subject matter or processes.
Example 1: Explainers in the Exploratorium

The Exploratorium6 is a science museum in the Bay Area of San Francisco. The High School Explainers are paid employees with an interest in science who talk to visitors at exhibits, do demonstrations, run errands and help to solve day-to-day problems, such as lost children. In order to be explainers, they have to master the details of the exhibits and the science background. They are the human face of the museum for most visitors. The explainers have up to 60 hours’ training, which inducts them into engaging in informal conversations with visitors and explaining key information about exhibits. There have been more than 3,500 explainers between 1969 and 2009. The classification of EPBL is deserved, because the diverse learning for the students is driven by their curiosity about science and how they can explain it to the public and how they can contribute generally to the running of the museum. They learn substantially through participative experience, overcoming challenges large and small. The explainers have an edge over full-time scientists, who have been known to baffle and overawe visitors. Their tasks include the following:

- Set up and monitor the museum for daily operations: open and close the museum, move exhibits and stools to proper locations, and assist staff during emergency procedures.
- Greet and orient individual visitors and groups.
- Oversee activity on the exhibit floor.
- Serve as a guide or facilitator, initiating contact with visitors to enrich the museum experience.
- Perform scientific demonstrations and engage visitors in the process.
- Help visitors with special needs through the museum when requested.
- Monitor museum exhibits to be sure that they are in good working order. Troubleshoot and report malfunctioning exhibits and perform minimal exhibit maintenance as instructed.
- Handle visitors’ lost items and respond when children become separated from parents or groups; provide assistance to reunite families.
- Staff the information desk on the museum floor.
- Perform other duties as assigned.

This is an example of taking the talents of young people seriously and creating participative educative experiences through particular community resources, in a setting outside of formal education.

Example 2. The ‘Scratch community’7

Scratch is a computational authoring environment – in effect, a simple programming language – which was developed at MIT (Massachusetts Institute of Technology) Media and launched in 2007. The participants can design interactive media products such as cartoons, games and simulations by putting together programming
sequences or blocks, made previously by others and freely available (Resnick et al., 2009). The sequences can be put together as simply as clicking together Lego bricks to make the programs that run their media. It therefore offers an online community made for sharing and interaction, as one can comment on others’ projects or ask for help. There are hundreds of thousands of participants, mainly aged 8–16, who have created 2.5 million projects. Although the project is supported by a university and broadly located in computer science, the participants have ownership of their own projects and the surrounding collaboration – all driven by curiosity and the creative urge. For many of the community members, the outcomes on their problem-solving and design skills and the impact on their identity and agency are significant.

One of the common processes identified by researchers (Brennan & Resnick, 2012) is testing and debugging. The strategies involved have been learned by trial and error, learned in other projects and imported (transferred), and learned through support from peers. One 10-year-old Scratcher identified:

- Identify the source of the problem.
- Read through your scripts (programs).
- Experiment with your scripts.
- Try rewriting scripts.
- Find example scripts.
- Tell/ask someone else about the problem.

These are strategies that, once generalised, will serve anyone well in a wide range of project and problem scenarios, like the everyday ones outlined on the first page of this chapter, such as buying and selling on eBay, or planning a family celebration. So, ‘find example scripts’ translates to ‘see if you can learn from what other people have done’. One 9-year-old Australian girl, when asked what she most liked about Scratch, mentioned uploading projects and spelled out the creative possibilities it offered: ‘Maybe it’s just the creativity of Scratch … It’s just there’s endless possibilities. It’s not just like you can make this project or this project and that’s all that you can make.’

Scratch is an example of the extent to which informal learning is developing in digital spaces, with no connection to formal education. Schools are in real danger of becoming anachronistic.

**Example 3: The Broomley Bee Project**

The final example is a more familiar project approach, undertaken in a Year 4 (9-year-olds) class in a primary school in Northumberland, England, and is described in more detail in Chapter 9. Few of these pupils were from disadvantaged backgrounds – EPBL works across the spectrum of abilities, working for high achievers as well as those who are less successful in mainstream school. The project focused on developing a flower-rich meadow to provide habitat for pollinating