‘As We Begin, So Shall We Go’: FOSIL as Means to a ‘Transcendent and Honourable End’

By Darryl Toerien

Snapshot

Philosophically, FOSIL (Framework Of Skills for Inquiry Learning) is an evolving theory of the inquiry-centred instructional role of the school librarian through which the school library becomes integral to the educational process, properly understood. In doing so, school becomes integral to broader efforts to strengthen the reality-based community of error-seeking inquirers upon which our imperilled democratic order depends. Practically, then, FOSIL is a model of the inquiry process based on the work of Barbara Stripling as expressed in the evolving ESIFC (Empire State Information Fluency Continuum), which is undergirded by a PK-12 framework of learning skills – metacognitive, cognitive, emotional, social and cultural – and a growing collection of resources that support the systematic and progressive development engaged and empowered inquirers within the context of subject area teaching. FOSIL is also a community of inquiry – the FOSIL Group – focused on FOSIL, but not exclusively so.

I was delighted to be approached by Susan about writing an article on FOSIL for Synergy, having long been indebted to colleagues from Australia, particularly in Victoria, for their inspirational work on A Manual for Developing Policies and Procedures in Australian School Library Resource Centres.

I start with two caveats:

- In the spirit of Alfred North Whitehead (1929), I take my insight where I find it. The circumstances that unexpectedly led me from teaching into school librarianship in 2003 necessitated that much of my early insight into the inquiry-centred instructional role of the school librarian in the educational process came from colleagues in America, the most influential being, chronologically, Jesse Shera (1972), Norman Beswick – in Sheehan (1969), although he was an Englishman in America at this very fruitful time, and had much to say about school librarianship back home, for example, The Past As Prologue: Two Decades of Missed Chances (1986) – Barbara Stripling (2003) and Carol Kuhlthau (2007). I should also mention successive editions of Information Literacy and Information Skills Instruction (Thomas, Crow, Henning, & Donham, 2020). In 2008, I was appointed Head of Library and Information Services at Oakham School in the UK, which offered the IB Diploma Programme alongside A-Levels, and so took insight from the IB community – most formatively John Royce, then at Robert College in Turkey – collectively expressed in Ideal Libraries: A Guide for Schools (2018). In 2019, I was elected to

the Standing Committee of the IFLA School Libraries Section, and so I drew insight from the IFLA School Library Guidelines (2015), which is itself the product of insight drawn from around the world over more than 50 years. In the same year I was invited to deliver a keynote address at the IASL 2019 Conference in Dubrovnik, where I met Dianne Oberg, who, with Jennifer Branch-Mueller, co-authored Focus on Inquiry for Alberta Learning (2004). In 2021, Elizabeth Hutchinson and I were invited to write an article for ACCESS (2021), which introduced me to Lee FitzGerald and the deeply thoughtful work of colleagues in Australia. For the history of school librarianship more broadly, I am currently reading Clyde (1981), Colebourn (1986), Latrobe (1998), and Alman (2017).

FOSIL – which stands for Framework Of Skills for Inquiry Learning – is an evolving response to a complex and longstanding problem

- Insight, however, as Matthew Syed (2015) points out, is the endpoint of long-term iterative process. This article, therefore, both reflects cumulative personal insight gained over the last 20 years, and positions further insight. Specifically, this article coincides with a book on inquiry that Barbara Stripling and I have been invited to write for Bloomsbury Libraries Unlimited. I am honoured, therefore, to share in this article both where insight has taken me and where it takes me still, so any loose ends in the article are due to a lack of time to weave them together more tightly here and now, and not due to a lack of respect for the reader.

FOSIL – which stands for Framework Of Skills for Inquiry Learning – is an evolving response to a complex and longstanding problem, and some context is necessary if FOSIL is to be properly understood.

Jesse Shera, in his monumental work, *The Foundations of Education for Librarianship* (1972), contoured the problem in these terms:

> Increasingly, *research as a method of instruction and an environment for formalized learning is being introduced into undergraduate as well as graduate programs*. This undergraduate research, or *more properly, inquiry, has its own characteristic information needs*, though academic librarians generally have given these requirements slight attention, while the faculty has tended to ignore them almost entirely. This neglect may doubtless be attributed to the fact that the instructors themselves were not properly encouraged in the use of the library in their own undergraduate years. The textbook and the reserve collection, which in the final analysis is only a kind of multiple text, have too long dominated undergraduate, and even graduate, instruction. The teacher's own mimeographed reading lists and bibliographies have been imposed between the student and the total library collection, largely because the typical faculty member does not trust either the bibliographic mechanisms of the library or the competence of the

librarians, while the *librarians, for their part, have never developed a theory of the role of the library in the student's intellectual experience*. This neglect has been intensified by the absence of any real communication between teacher and librarian, both have paid lip service to *the library as a 'learning center*,' and having said that satisfied their sense of obligation with a short course or a few lectures on 'How to Use the Library.' (pp. 177, emphasis added)

Of particular concern is Shera's charge that academic librarians had failed to develop a theory of the role of the library in the inquiry learning process, especially given the increasingly widespread introduction of inquiry as a method of instruction and an environment for formalized learning with characteristic information needs.

Some reflection on this charge is in order:

- The introduction of inquiry as a method of instruction and an environment for formalized learning at this time was not limited to undergraduate and graduate programs at universities, at least not in America. Neil Postman and Charles Weingartner, for example, in Teaching as a Subversive Activity (1971), devote an entire chapter to inquiry and the inquiry environment, going so far as to claim that 'of the survival strategies that education had to offer, none was more potent than the inquiry environment' (p. 36). However, and tellingly in the light of Shera's charge above, they do so without any reference to school librarians. This particular disconnect between the school library and education, which more broadly persists to pernicious effect (Pun, 2021), is all the more puzzling in the light of Douglas Knight's Forward to Library Services for the Nation's Needs: Toward Fulfillment of a National Policy (1968), in which he describes the librarian, regardless of type, as 'a teacher whose subject is [the] learning [process] itself', which, given the vital collaboration between 'those who first teach the mind to inquire and those in the libraries who can show it how to inquire' (p. ix), is an inquiry process.

...Daniel Callison and Leslie Preddy ...'the school library only exists as a learning centre because of inquiry'...

- This is not to say, though, that school librarians had no interest in and/ or involvement with inquiry. Daniel Callison and Leslie Preddy (2006), for example, argued that 'the school library only exists as a learning centre because of inquiry' (p. 601), and that 'the progression to student-centered, inquiry-based learning through school library programs was clearly underway more than forty years ago' (Callison, 2015, p. 3), at least in America, and can be traced back to 1960 (p. 213). More broadly, Callison lists the International Baccalaureate (IB) Programme as an early adopter of inquiry (p. 214). The IB was founded in 1968, although the philosophy, structure, content and pedagogy of the IB Diploma Programme, which was the first IB Programme, were developed in 1962 (IBO, 2017). The

Diploma Programme was followed by the Middle Years Programme, the Primary Years Programme, and the Career-related Programme, with 'inquiry, as a curriculum stance, pervading all Programmes' (Tilke, 2011, p. 5).

- However, the first enduring models of the inquiry process – as distinct from information search/ problem-solving models or information literacy models – that were developed by school librarians only emerged in the early 2000s, although they were grounded in student-centred process models that were developed in the late 1980s:

    - **Stripling's Model of Inquiry** (2003) / New York City Information Fluency Continuum (NYIFC, developed in 2009 and incorporated into the ESIFC in 2012) / Empire State Information Fluency Continuum (developed in 2012 and reimagined in 2019), which was grounded in Research as a Thinking Process / REACTS Taxonomies (Stripling & Pitts, 1988) – for personal reflections on the development of Stripling's Model of Inquiry, see E&L Memo 1 | Learning to know and understand through inquiry (Stripling, 2020)

        - Framework Of Skills for Inquiry Learning (developed in 2011 and reimagined in 2019 along with the ESIFC), which was adapted from the NYCIFC and then developed alongside the ESIFC – for personal reflections on the development of FOSIL, see E&L Memo 0 | Developing inquiring minds: a journey from information through knowledge to understanding (Toerien D. , 2019)

    On a philosophical level, then, FOSIL is an evolving theory of the role of the library in the student's intellectual experience, which is centred on inquiry.

    - **Alberta Model of Inquiry** / Focus on Inquiry (2004), which was grounded in the instructional component of An Integrated Programme Model for School Libraries (developed by Alberta Education in 1988) / Research Process Model (developed by Alberta Education / Anderson & Blakey in 1990) – for personal reflections on the development of the Alberta Model of Inquiry, see E&L Memo 2 | Focus on Inquiry: Reflections on Developing a Model of Inquiry (Oberg, 2021)
    - **Guided Inquiry** (2007) / Guided Inquiry Design (2012), which was grounded in the Information Search Process model (developed by Carol Kuhlthau in 1989)

These models are four of the five models included in *Global Action for School Libraries: Models of Inquiry* (Schultz-Jones & Oberg, 2022), with the fifth model included in the book being Informed Learning, which I have not listed above because it is not grounded in the reality of PK-12 education, and it seems more accurately to be an information literacy model (the distinction being the subject of another article):

- The Stripling Model of Inquiry (Stripling, 2022)
- FOSIL: Developing and Extending the Stripling Model of Inquiry (Toerien D. , 2022)
- Guided Inquiry Design (Edwards, 2022)
- Focus on Inquiry: An Information Search Process Model Adapted for Alberta (Branch-Mueller & Oberg, 2022)
- Informed Learning: Engaging with Information Enables Learning (Maybee & Whisken, 2022)

The book also includes a chapter on implementing FOSIL in Grade 11-12 Politics, titled Deep Collaboration by Teacher and Librarian to Develop an Inquiry Mindset (Sanders & Toerien, 2022) – see also Curricular Inquiry: Learning Between the Library and the Classroom (2022), where the authors discuss this work more broadly in a recording of their presentation at the IFLA School Libraries Section 2022 Midyear Meeting at Blanchelande College.

...that inquiry has as its starting point students in the process of becoming increasingly independent learners through engaging and empowering encounters with ideas...

On a philosophical level, then, FOSIL is an evolving theory of the role of the library in the student's intellectual experience, which is centred on inquiry. For our keynote address at the UK School Library Association 2021 Conference, Barbara Stripling and I defined inquiry as 'a stance of wonder and puzzlement that gives rise to a dynamic process of coming to know and understand the world and ourselves in it as the basis for responsible participation in community' (Stripling & Toerien, 2021). This definition was informed by the work of the Galileo Educational Network (GEN), which served as the professional learning arm of the Werklund School of Education at the University of Calgary from 1999-2021, which was, in turn, informed by the work of the Developing Inquiring Communities in Education Project (DICEP), which was led by Gordon Wells from the Ontario Institute for Studies in Education at the University of Toronto from 1991-2001 (2001). It is worth noting here that, as with *Teaching as a Subversive Activity in America*, there appears to be no mention of, or obvious involvement from, school librarians in either DICEP (Alberta) or GEN (Ontario) in Canada, which is an apparent disconnect that also requires further investigation.

Our definition, more broadly, is rooted in even earlier 'efforts [crystalised into the concept of the *library-college* by Louis Shores as early as 1933] to centre education in the learning process rather than the teaching process, to encourage initiative and independence on the part of the student, and to bring the student to grips with original thought as expressed in books and other media' (Sheehan, 1969, p. 98). Now it is important to note that this view does not exclude experience from the learning process, which is fundamentally an inquiry process; rather, as Norman Beswick (1967) observes, it highlights that while 'some knowledge, truly, comes from experience and experiment, most knowledge [comes] from record, in the widest McLuhan-like sense' (p. 201). This observation begins to address the characteristic information needs of inquiry, which is essential if we are to formulate a compelling theory of the role of the library in the student's intellectual experience. Douglas Knight, in his Foreword cited above, elaborates:

- **Our first and foremost task is to engage students in the learning process of acquiring knowledge, which is fundamentally an inquiry process, and empowering them to do so.**

> A library [regardless of type] has two major and unique functions. First, it makes possible meetings of mind and idea [in and through our collections] which are not limited by our normal boundaries of time, space, and social or economic level. … To say this is to suggest the second great function of a library. It is the institution in our society which allows and encourages the development, the extension of ideas – not their passive absorption, but their active generation. … The technical means of his encounter may be a record, a tape, a film, a print-out or – most radical of all – a book. Libraries are not bounded by means; they will and should employ any means to achieve their ends. (p. viii)

It is against this backdrop that Beswick (1967) asserts that 'it is not the library that 'supports' the classroom … but the classroom that leads (or should lead) inevitably and essentially to the library' (p. 201). This, of course, is not the only way to view and approach education, especially in school, which brings us to McLuhan's titular caution – 'as we begin, so shall we go' (1996, pp. 46-47) – that our means tend to become ends in and of themselves.

Although beyond the scope of this article, some reflection on educational means and ends is necessary if we are to recover, or perhaps discover, the potency of the inquiry environment. Neil Postman, in his ambiguously titled book, *The End of Education: Redefining the Value of School* (1996), states that 'without a transcendent and honorable purpose schooling must reach its finish, and the sooner we are done with it, the better' (pp. x-xi). It should be clear from the discussion above that inquiry has as its starting point students in the process of becoming increasingly independent learners through engaging and empowering encounters with ideas as expressed in books and other media, enabled by close collaboration between 'those who first teach the mind to inquire, and those in the libraries who can show it <u>how</u> to inquire … [librarians who are] teachers whose subject is learning itself' (Knight, 1968, p. ix). The end of this process, as termed by Jacques Maritain (1962), is *terminal freedom*, which is 'the fulfillment of the deepest potentialities of the human being in the world' (p. 10), which has a personal, social, and, for Maritain, ultimately spiritual dimension. *This* – terminal freedom – is the titular

‘transcendent and honorable purpose’ (Postman, 1996, pp. x-xi) that provides reasons for the young continuing to educate themselves, which inquiry calls them to and equips them to do.

What does terminal freedom look like? This, from the perspective of school, is visualised in the Portrait of an Engaged and Empowered Inquirer at Grade 12, which we will return to (Figure 1 | Click here to enlarge).

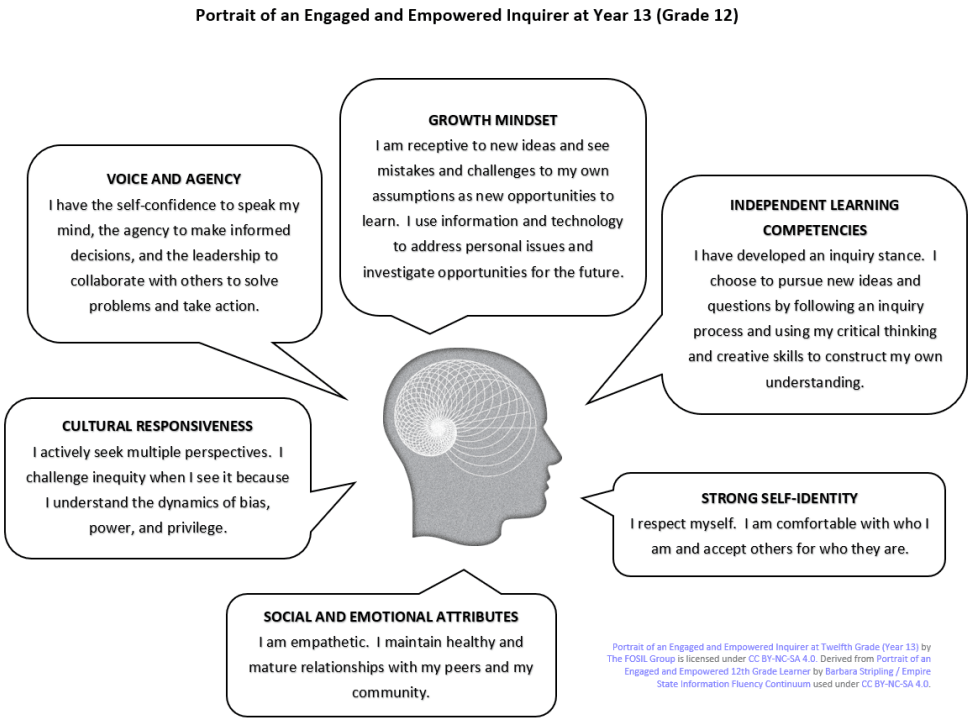


Figure 1: Portrait of an Engaged and Empowered Inquirer at Grade 12 (Toerien D. , 2022)

However, Postman, in *Teaching as a Conserving Activity* (1979) and *The End of Education: Redefining the Value of School* (1996), identified three debilitating tendencies that sap inquiry of its educational potency, and which still threaten to do so. These tendencies are:

1. to divorce inquiry as a dynamic process and skills from learning important content (1979, p. 214);
2. to reduce inquiry to a mechanical process by divorcing it from a spirit of wonder and puzzlement (1979, p. 214);
3. to divorce inquiry from both a spirit of wonder and puzzlement and a dynamic process, and so reduce it to a thoughtless fact-finding activity (identified by the author of this article);
4. to engineer learning through ever-more technical teaching methods based on ‘hard evidence’ from the field of cognitive science (1996, p. 26).

The first three of these tendencies were effectively countered through the sound models of the inquiry process that were developed by school librarians at the turn of the century, properly understood and implemented. As Stripling (2017), for example, reminds us:

> Providing a framework of the inquiry process is only the first step in empowering students to pursue inquiry on their own. The next step is to structure teaching around a framework of the literacy, inquiry, critical thinking, and technology skills that students must develop at each phase of inquiry over their years of school and in the context of content area learning.' (p. 52)

This is reflected in the Spiral of Authentic Inquiry Learning (Figure 2).

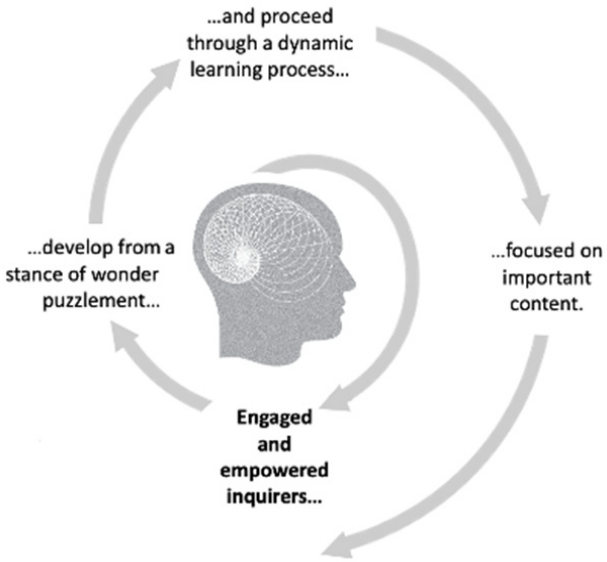


Figure 2: FOSIL Spiral of Authentic Inquiry Learning
(Stripling, Toerien, & Toerien, 2024)

However, by the time school librarians were able to counter the first three debilitating tendencies that sapped inquiry of its educational potency, inquiry had become the bogeyman of progressive education, and cognitive science, with its emphasis on explicit/ direct instruction, the darling of 'evidence-based' traditional education. This evidence, however, is not as conclusive as it may appear to be or have been made to seem. Matthew Evans (2024), for example, highlights the distinction between Cognitive Science as a discipline (CS-dis) and the way in which aspects of the discipline have 'been deployed by advocates in education in the UK and elsewhere (CS-edsoc [or #CogSci/ #EduCogSc on #EduTwitter]) in the last decade or so,' discussing the factors that strengthened the CS-edsoc wave, as well as warning signs that it is breaking, or more likely dissipating. For a broader discussion of the explicit/ direct instruction vs inquiry 'debate,' see Locating ourselves in the epistemological landscape (Toerien & Toerien, 2020, 2024).

Some brief observations on this particular, and particularly, debilitating development are necessary. Jacques Maritain (1962) reminds us that 'when a science has man for its object, it comes into the category of the sciences of values' (p. 40), and values are choices. Furthermore,

'underlying all questions concerning the basic orientation of education, there is the philosophy of knowledge to which the educator consciously or unconsciously subscribes' (p. 45). In a recent interview about his evolving understanding of powerful knowledge, Michael Young (2022) was asked what advice he would give to teachers interested in applying his ideas about powerful knowledge – knowledge that enables students to understand and think beyond the limits of their own experience – to how they interpret their school's curriculum. His response is enlightening and encouraging:

> The curriculum is not just a body of knowledge; it's a group of communities we must encourage our students to join. … I would remind them of a point [Russian psychologist] Lev Vygotsky made: that acquiring knowledge in school has to be the voluntary act of a learner. You can't actually teach anybody anything; they have to learn it. You can help them, but they've got to have that desire to know. … If you haven't encouraged students to engage in the process of acquiring knowledge, which is a very difficult process, then all you get is memorisation and reproduction in tests. … The current interest in the curriculum overlooks this point. It's so concerned with saying, 'Have we got the knowledge?' that it forgets to ask, 'How is the knowledge being acquired?'

…a framework, or progression, of inquiry skills must evolve in response to changes in the environment…

Young's answer has some important and far-reaching implications for us:

- Body of knowledge is more accurately bodies of knowledge – fields/ branches of knowledge, or academic disciplines/ subjects that cohere meaningfully. However, it is unlikely that our students view and/ or experience the curriculum as a meaningfully coherent whole. As Whitehead (1929) puts it:

  > The solution which I am urging, is to eradicate the fatal disconnection of subjects which kills the vitality of the modern curriculum. There is only one subject-matter for education, and that is Life in all its manifestations. Instead of this single unity, we offer children – Algebra, from which nothing follows; Geometry, from which nothing follows; Science, from which nothing follows; History, from which nothing follows; a Couple of Languages, never mastered; and lastly, most dreary of all, Literature, represented by plays of Shakespeare, with philological notes and short analyses of plot and character to be in substance committed to memory. Can such a list be said to represent Life, as it is known in the midst of the living of it? (p. 10)

- These communities of knowledge-acquisition more or less overlap for their student members, in that the students belong to more than one of them, but almost certainly don't overlap for their teacher members, which reinforces the above view and/ or experience of the curriculum.
- Powerful knowledge is neither self-evident nor an end in itself.

- Learning, which is the process of acquiring knowledge, is the voluntary act of the learner, and it cannot be forced by the teacher. This is humbling, because as John MacBeath (1993) pointed out forty years ago, one of the most important lessons to come out of more than forty years of literature on school failure is that 'teachers must recognise the limitations of teaching and become much more sophisticated in their understanding of learning' (p. 8). More than forty years takes us back to Maritain, who cautioned that

> 'the principal agent in education, the primary dynamic factor or propelling force, is the internal vital principle in the one to be educated [and] any education which considers the teacher as the principal agent perverts the very nature of the educational task' (1943, pp. 31-32).

This does not negate the role of the teacher. Rather, as Seymour Papert, who developed Jean Piaget's theory of cognitive development into a theory of learning, and who greatly influenced the thinking behind FOSIL, puts it:

> 'The constructionist attitude to teaching is not at all dismissive because it is minimalist – the goal is to teach in such a way as to produce the most learning for the least teaching [which] cannot be achieved simply by reducing the quantity of teaching while leaving everything else unchanged' (Papert, 1994, p. 139).

Learning, which is the process of acquiring knowledge, is the voluntary act of the learner, and it cannot be forced by the teacher.

- However, the process of acquiring knowledge, or learning, is not merely memorization and reproduction in tests. This is sobering, because it raises questions about the extent to which we conflate memorisation and reproduction in tests with learning, and the extent to which our instructional efforts and resources are directed at memorization and reproduction in tests. Given the near-total reduction of learning to this, it perversely seems that whatever sophistication we may have gained in our understanding of learning from the 'science of learning' has not been directed towards engaging students in the learning process of acquiring knowledge, but in engineering learning through the teaching process. This threatens to make true Ivan Illich's exaggerated accusation that the principal lesson that school teaches is the need to be taught (Illich, 1971).
- Our first and foremost task is to engage students in the learning process of acquiring knowledge, which is fundamentally an inquiry process, and empowering them to do so. This is challenging, as it inverts much of what we do, and how we do it.

That learning is more than mere memorisation and reproduction in tests, and education even more still, is clear from any school's stated purpose or vision. What is less clear, however, is how all of the things that schools do meaningfully combine to actually produce this, especially when memorization and reproduction in tests tends to dominate so much of learning and teaching. Maritain (1952) captures the significance and value of our *educational* calling powerfully:

> Nothing is more important than the events which occur within that invisible universe which is the mind of [a person]. And the light of that universe is knowledge. If we are concerned with the future of civilization we must be concerned primarily with a genuine understanding of what knowledge is, its value, its degrees, and how it can foster the inner unity of the human being. (p. 3)

We must now briefly consider the disastrous consequences of our collective failure to engage students in the inquiry learning process of acquiring knowledge and to equip them to do so.

Bertrand Russel, in *Free Thought and Official Propaganda* (1922), argued that

> 'education should have two objects: first, to give definite knowledge – reading and writing, languages and mathematics, and so on; secondly, to create those mental habits which will enable people to acquire knowledge and form sound judgments for themselves' (p. 29).

He then goes on to lament that

> 'our system of education turns young people out of the schools able to read, but for the most part unable to weigh evidence or to form an independent opinion, and then they are then assailed, throughout the rest of their lives, by statements designed to make them believe all sorts of absurd propositions….' (pp. 31-32).

By the turn of the century, the situation had become more acute. Dallas Willard, in *The Unhinging of the American Mind - Derrida as Pretext* (1999), writes that without recourse to knowledge of reality as provided by the disciplines, and the texts through which that knowledge is communicated and preserved, people become vulnerable to

> 'desire and will/ brute force … as social processes come to be managed by people who simply know how to get their way among a mass of those who no longer believe that they can, with the aid of their culture's texts and the traditional disciplines, determine how things are in nature, art or morality, regardless of how anyone wishes them to be or how people with social authority present them.'

This anticipates the existential threat, which is epistemological in nature, confronting our democratic order today.

Jonathan Rauch, in *The Constitution of Knowledge: A Defence of Truth* (2021), writes 'that American

civic life might be losing its grip on reality: its ability, that is, to tell truth from untruth or even believe there is a difference' (p. 9). This condition is not unique to America, as even a passing glance at any given day's newspaper headlines will confirm. Rauch's purpose is to explain and defend what he calls the Constitution of Knowledge, which is our social system and its underlying values for turning information into knowledge, and arguments into facts. Rauch outlines this process, or journey, in some detail (pp. 3-4): it 'begins with curiosity, with wonder;' then 'the hypothesis, the thesis, the seemingly plausible account;' then 'the efforts to test that account against the world, by asking still more questions;' then, often, 'the moment when the hypothesis lists or collapses;' then, if lucky, 'out of the dizziness…a stronger hypothesis, something closer to truth,' or if unlucky, 'a reminder to be humble in the face of reality's caprice.' While this journey necessarily involves 'personal struggles to find the right questions and assemble mosaic tiles of information to tell the tale coherently,' Rauch is quick to remind us that 'acquiring knowledge is a conversation, not a destination…a journey we take together, not alone [because] others are always involved.

> ' It is out of this conversation, this journeying together, that our shared commitment and accountability to the truth, and the methods of establishing the truth, emerges, producing a reality-based community of 'error-seeking inquirers' (p. 15)

who throughout time uphold and are upheld by the Constitution of Knowledge.

Tellingly, although unsurprisingly, Rauch makes no mention of schools in strengthening the reality-based community of error-seeking inquirers upon which our democratic order depends. This may yet be our undoing, given that, as Postman and Weingartner (1971) warned us more than half a century ago, 'school, after all, is the one institution in our society that is inflicted on everybody, and what happens in school makes a difference – for good or ill' (p. 12). The question, then, bearing in mind that independent schooling plays its own role in creating a public, is not:

> 'Does or doesn't public schooling create a public? The question is, What kind of public does it create? A conglomerate of self-indulgent consumers? Angry, soulless, directionless masses? Indifferent, confused citizens? Or a public imbued with confidence, a sense of purpose, a respect for learning, and tolerance?' (Postman, 1996, p. 18)

Assuming that we choose to strive, or even fight, for a 'public imbued with confidence, a sense of purpose, a respect for learning, and tolerance' – a reality-based community of error-seeking inquirers – it is clear that memorisation and reproduction in tests, important as this may be, will not serve us as a means to this end, especially given our tendency to treat this means as an end in itself. So how, then, should we begin to go?

Gordon Wells (Wells, *The Development of a Community of Inquiry*, 2001), reflecting on 10 years of DICEP's ground-breaking work, orients us well:

> The force that drives the enacted curriculum must be a pervasive spirit of inquiry, and the dominant purpose of all activities must be an increase in understanding … teacher and students together must become a community of inquiry with respect to all aspects of the life of the classroom and all areas of the curriculum … if classrooms [are] to become places where students [are] actively and enthusiastically attempting to construct answers to questions that [are] of real interest to them - rather than simply going through the routines of 'doing school' - more [will] be needed than the introduction of prepackaged inquiry activities, taken from teachers' manuals or downloaded from the Internet. (pp. 7-8)

This frames the inquiry environment, within which we can visualise the systematic and progressive development of an engaged and empowered inquirer at Grade 12, Grade 8, Grade

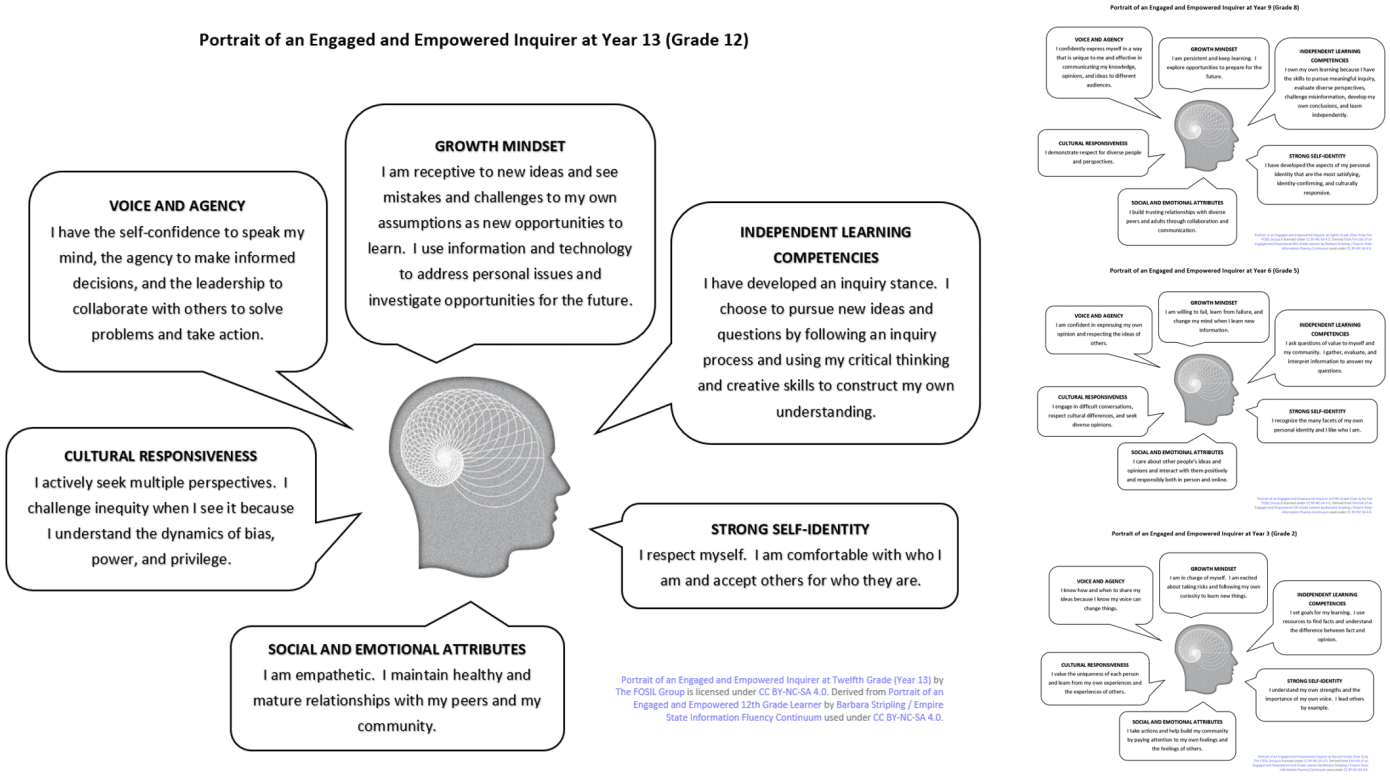


Figure 3: Portrait Attributes of an Engaged and Empowered Inquirer Overview (Toerien D. , 2022)

5, and Grade 2 (see Figure 3 | Click here to enlarge| See also Portraits of an Engaged and Empowered Inquirer for each of the Portraits).

These portraits and their accompanying attribute-statements, which were developed by Barbara Stripling and a team of Digital Lead Librarians from New York City, provide a high-level description of the end towards which we are working in each phase of school, which is students who are able to demonstrably describe themselves in this way. Practically, the value of the portrait attribute-statements is that they are developed through inquiry, but their development is not limited to inquiry. This becomes clear when we look at the typical skills that develop these attributes in relation to the inquiry process, which is also one of the

main reasons why FOSIL is on the ESIFC, being the highly detailed and deeply considered PK-12 framework of skills that both undergirds the inquiry process and is its outworking. This is illustrated in the Portrait Attributes Developed Through Inquiry in Grades 3-5, which benchmarks the transition from primary to secondary school (Figure 4 | Click here to enlarge | See also Portraits of an Engaged and Empowered Inquirer for Portrait Attributes Developed Through Inquiry in Grades K-2, 3-5, 6-8, and 9-12, which are freely downloadable as PDFs).

Year 4-6 (Grade 3-5) Portrait Attributes Developed Through Inquiry

Attributes	Independent Learning	Strong Self-Identity	Social and Emotional	Cultural Responsiveness	Voice and Agency	Growth Mindset
Year 4-6	I ask questions of value to myself and my community. I gather, evaluate, and interpret information to answer my questions.	I recognize the many facets of my own personal identity and I like who I am.	I care about other people's ideas and opinions and interact with them positively and responsibly both in person and online.	I engage in difficult conversations, respect cultural differences, and seek diverse opinions.	I am confident in expressing my own opinion and respecting the ideas of others.	I am willing to fail, learn from failure, and change my mind when I learn new information.
Many skills and attitudes may be taught **explicitly**. Others may be included **implicitly**. Assessment strategies and Graphic Organizer numbers are noted for explicit teaching of skills and attitudes.						
Stages	**Independent Learning**	**Strong Self-Identity**	**Social and Emotional**	**Cultural Responsiveness**	**Voice and Agency**	**Growth Mindset**
Connect	I can identify aspects of the broad topic that I think would be important and interesting to pursue through inquiry [3-5.1]	I can recognize multiple facets of my own personal identity [3-5.2]	I can reflect on my own social and emotional strengths and challenges [3-5.52]	I can use a source provided by the teacher to acquire background information [3-5.3]	I can actively contribute to group discussions [Observation]	I can begin to develop a plan for following an inquiry process to ask questions and find evidence to answer questions about a research topic.
Wonder	I can formulate questions for investigation of a topic [3-5.5; 3-5.6]	I can formulate questions for investigation of a topic [3-5.5; 3-5.6]		I can begin to assess my questions to determine which I can answer with simple facts, which cannot be answered, and which would lead me to an interesting inquiry [3-5.7]		I can predict answers to my inquiry questions based on background knowledge and beginning observation or experience.
Investigate	I can evaluate information within a source for accuracy, relevance, comprehensiveness, and point of view [3-5.14; 3-5.16; 3-5.21; 3-5.29]	I can demonstrate basic cybersafety (strong passwords, privacy, accessing appropriate sites) [3-5.20]	I can identify and empathize with the perspectives of others [Observation; Class Discussion]	I can identify and challenge my own assumptions about community issues and diverse cultures by seeking and considering multiple viewpoints and cultural perspectives [3-5.22; 3-5.30]	I can exhibit effective skills in sharing knowledge I have gained through personal and academic pursuits [Assessment of Final Product]	I can engage actively in a design process to use tools, resources, and materials to try the "if. . .then" solutions that seem to have the most potential, assess the results, and modify the solutions when needed [3-5.34; 3-5.35]
Construct	I can draw a conclusion about the main idea with evidence to support that conclusion [3-5.38; 3-5.39]	I can form my own opinion or claim and use evidence from texts and clear reasoning to back it up [3-5.40; 3-5.41]	I can actively solicit and listen with an open mind to the opinions and ideas of others [Observation; Class Discussion]	I can engage in conversations with my classmates to exchange ideas and information about social and civic issues [Class Discussion]	I can form my own opinion or claim and use evidence from texts and clear reasoning to back it up [3-5.40; 3-5.41]	
Express	I can create a presentation with attention to quality of content and effective use of tools, and I can deliver it effectively with self-confidence [3-5.45; 3-5.46]	I can use strategies to avoid plagiarizing by summarizing, paraphrasing, quoting, and crediting the information [3-5.18; 3-5.19]	I can engage in positive online behavior by dealing with cyberbullying, recognizing and avoiding stereotypes, and selecting appropriate sites only [3-5.48]	I can demonstrate basic netiquette behavior by interacting respectfully with others and contributing to a positive online community [3-5.48; 3-5.49]	I can deliver a presentation effectively with self-confidence [3-5.45; 3-5.46]	I can advocate for or take action to implement the [research] plan.
Reflect	I can reflect on my new understandings, the effectiveness of my product and presentation, and my experience during the process of inquiry [3-5.50; 3-5.51]	I can build my own self-awareness by reflecting on my responses to learning experiences and social interactions and discovering what makes them positive [3-5.51]	I can reflect on own social and emotional strengths and challenges [self-awareness] [3-5.50; 3-5.51; 3-5.52]		I can set reading and learning goals and persevere to achieve those goals [self-management] [Conversation; Book Checkout]	I can follow my own personal and academic interests to pursue in-depth inquiries and build deep knowledge [Observation; Conversation; Book Checkout]

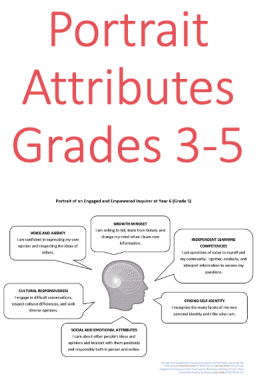
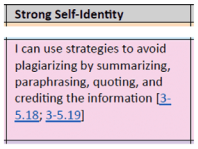
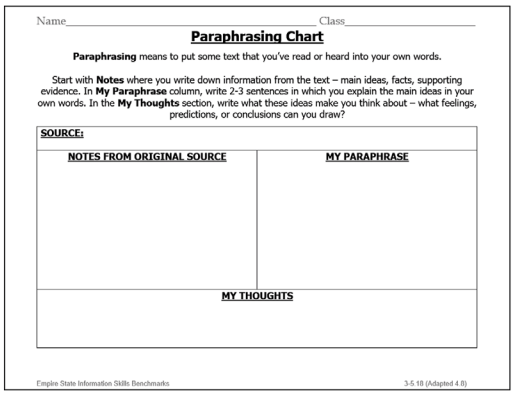


Figure 4: Portrait of an Engaged and Empowered Inquirer at Grade 12 (Toerien D. , 2022)

These typical skills, which can be required in the inquiry process, or outside of the inquiry process but be logically related to it, are priority skills that need to be taught/ developed and/ or assessed. The majority of these priority skills are linked to ESIFC graphic organisers, which are freely downloadable, and which serve an instructional and/ or assessment purpose; for example, the Paraphrasing Chart, which is a skill located in the Strong Self-Identity Attribute and the Express stage of the inquiry process (Figure 5 | Click here to enlarge).




Name_____ Class_____

Paraphrasing Chart

Paraphrasing means to put some text that you've read or heard into your own words.

Start with **Notes** where you write down information from the text – main ideas, facts, supporting evidence. In **My Paraphrase** column, write 2-3 sentences in which you explain the main ideas in your own words. In the **My Thoughts** section, write what these ideas make you think about – what feelings, predictions, or conclusions can you draw?

SOURCE:

NOTES FROM ORIGINAL SOURCE	MY PARAPHRASE

MY THOUGHTS

Empire State Information Skills Benchmarks 3-5.18 (Adapted 4.8)

Figure 5: Paraphrasing Chart / ESIFC Graphic Organiser 3-5.18 (Toerien, D. , 2024)

This particular skill – paraphrasing – is actually a complex of skills, because it also requires students to, for example, be able to make notes from an original source and reflect on their notes as the basis for their paraphrase, which highlights the importance and value of a deeply considered framework of skills if they are to be developed systematically and progressively within the learning process. It is also clear that the purposeful development of this complex of skills is foundational to academic integrity, and that use of developmentally appropriate graphic organisers such as this *during* the learning process is the only educationally effective way to deal with the threat of AI to academic integrity.

While the skill focus of this graphic organiser – paraphrasing – locates it in the Express stage of the inquiry process, the fact that it is a complex of skills means that more than one stage of the inquiry process is involved. This illustrates a difference in focus between the ESIFC graphic organisers, which is on particular skills, and the FOSIL graphic organisers, which is on particular stages across one or more grades for example, the Investigative Journal (Figure 6 | Click here to enlarge).

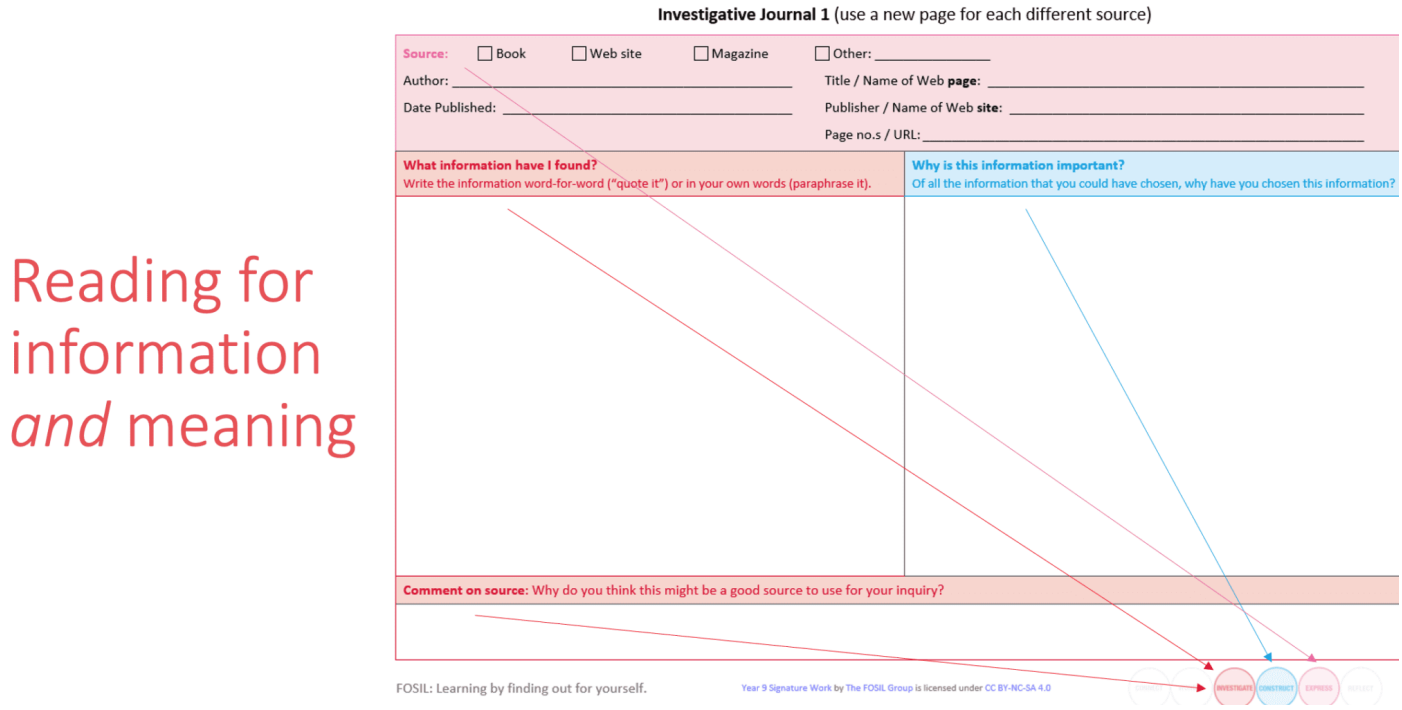


Figure 6: Investigative Journal for Grade 8 Signature Work from Instructional Presentation

Because FOSIL is being developed alongside the ESIFC, this difference in focus of the graphic organisers is a strength of FOSIL, in that the ESIFC allows us to work down from one or more stages in the inquiry process to developmentally appropriate skills, or up from developmentally appropriate skills to one or more stages in the inquiry process. FOSIL graphic organisers also make use of colour for instructional purposes, which is discussed more fully below.

Inquiry, from the perspective of FOSIL, is:

> a process for learning that involves (1) connecting to personal interests and a desire to know, and gaining background knowledge, (2) asking questions that probe beyond simple fact gathering, (3) investigating answers to gather evidence from multiple perspectives and sources, (4) constructing new understandings and drawing conclusions with support from evidence, (5) expressing the new ideas through a variety of formats, and (6) reflecting metacognitively on both the process and the product of learning. (Small, Arnone, Stripling, & Berger, 2012, p. 3)

The stages in the process as described here recall Rauch's process of reality-based error seeking and highlight the critical role that inquiry can and must play in school preparing students for their active role in strengthening the reality-based community of error-seeking inquirers upon which our democratic order depends.

Reflection on these stages, first described by Stripling in Curriculum Connections Through the Library (2003), resulted in the third and current iteration of the FOSIL Inquiry Cycle (Figure 7 | Click here to enlarge or download as a PDF).

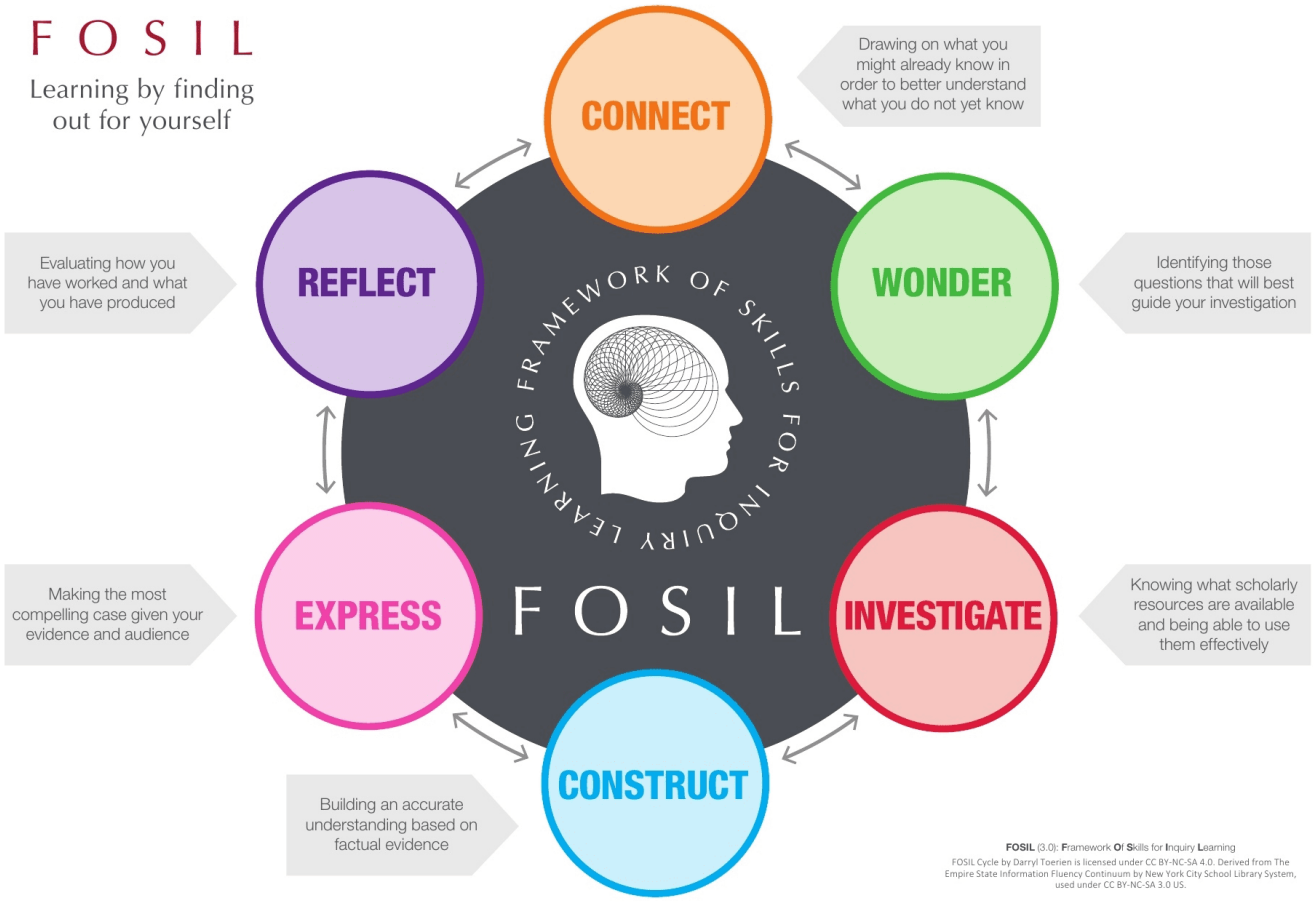


Figure 7: FOSIL Inquiry Cycle (Toerien D. , 2023)

FOSIL stands for **F**ramework **O**f **S**kills for **I**nquiry **L**earning, which it basically is. However, the fact that it also sounds like fossil is deliberate. Firstly, the discipline of archaeology is a helpful way to think and talk about inquiry – as the process of carefully and thoughtfully uncovering

something – especially with children. Secondly, it serves as a warning against complacency, because a framework, or progression, of inquiry skills must evolve in response to changes in the environment – as the ESIFC, which was first developed in 2009, was reimagined in 2019 – if it is to remain vital rather than become fossilised.

This idea is reflected in the FOSIL logo/ head, which is suggestive not only of an ammonite fossil, but also of inquiry as being an iterative process that, while cognitively central, unfolds to involve us fully as social human beings. Placing the FOSIL head/ inquirer at the centre of the FOSIL Inquiry Cycle is deliberate, then, and also makes it clear that reflection is central to and occurs throughout the dynamic process and is not limited to the distinct Reflect stage.

FOSIL uses the same names as the ESIFC for the stages in the process, but the use of colour is deliberate and unique to FOSIL. Colour serves two instructional purposes, and one practical one – see Does it matter which colours I use for the FOSIL stages? (Toerien D. , 2023) for examples:

- Firstly, one of the main reasons for basing FOSIL on Stripling's Model of Inquiry is that it is both logical and simple without losing any of its explanatory power for its simplicity. Colour initially served only as an aid to remembering the stages and their order in the process, especially for younger students. However, colours have different cognitive, social & emotional, and physical associations, and, following some deliberation, the colours that seemed to be most closely associated with what is happening in each stage were assigned to those stages.
- Secondly, being able to identify/ recognise a stage by its colour helps us to locate ourselves within a dynamic learning process, and this has both shaped and is reflected in our approach to graphic organisers. Unlike the ESIFC, which approaches graphic organisers from the perspective of individual skills, FOSIL approaches graphic organisers from the perspective of stages and the dynamic movement between stages. This sense of place in the inquiry process is reinforced in the footer of each resource (see 'FOSIL template' in Resources), which also helps when colour is not appropriate/ possible, for example, when printing without access to a colour printer.
- Thirdly, consistency in our use of colours grows a shared vocabulary that allows us to more easily and effectively collaborate on making the school library integral to the educational process through inquiry.

The definitions of the stages are descriptions of what is happening in each stage. These descriptions were influenced by work then being done on inquiry within the context of the IB Diploma Programme Extended Essay. On further reflection, 'credible' might be better than 'scholarly' in the Investigate stage. The double-headed arrows between the stages serve as a reminder that the inquiry process is cyclical and recursive, rather than linear and mechanical, and that one or more stages might need to be revisited a number of times during the course of an inquiry.

Note that the FOSIL tagline is **Learning by finding out *for* yourself**, not ***by*** yourself, which suggests minimal or no guidance and/ or interventions, which is the tree that Kirschner, Sweller, et al are wont to keep barking up – see [Locating ourselves in the epistemological landscape](#) (Toerien & Toerien, 2020, 2024). The FOSIL tagline may be more fully understood in terms attributed to Seymour Papert, which is that we cannot teach students everything that they need to know, so the best we can do is position them where they can find what they need to know when they need to know it.

Collaboration with colleagues working in primary schools, or in primary phases of PK-12 schools, led to the development of a simplified version of the FOSIL Inquiry Cycle, which, after consultation with Barbara to confirm that it retained the original model's explanatory power, was released in 2022 (Figure 8 | Click [here](#) to enlarge or [download as a PDF](#)).

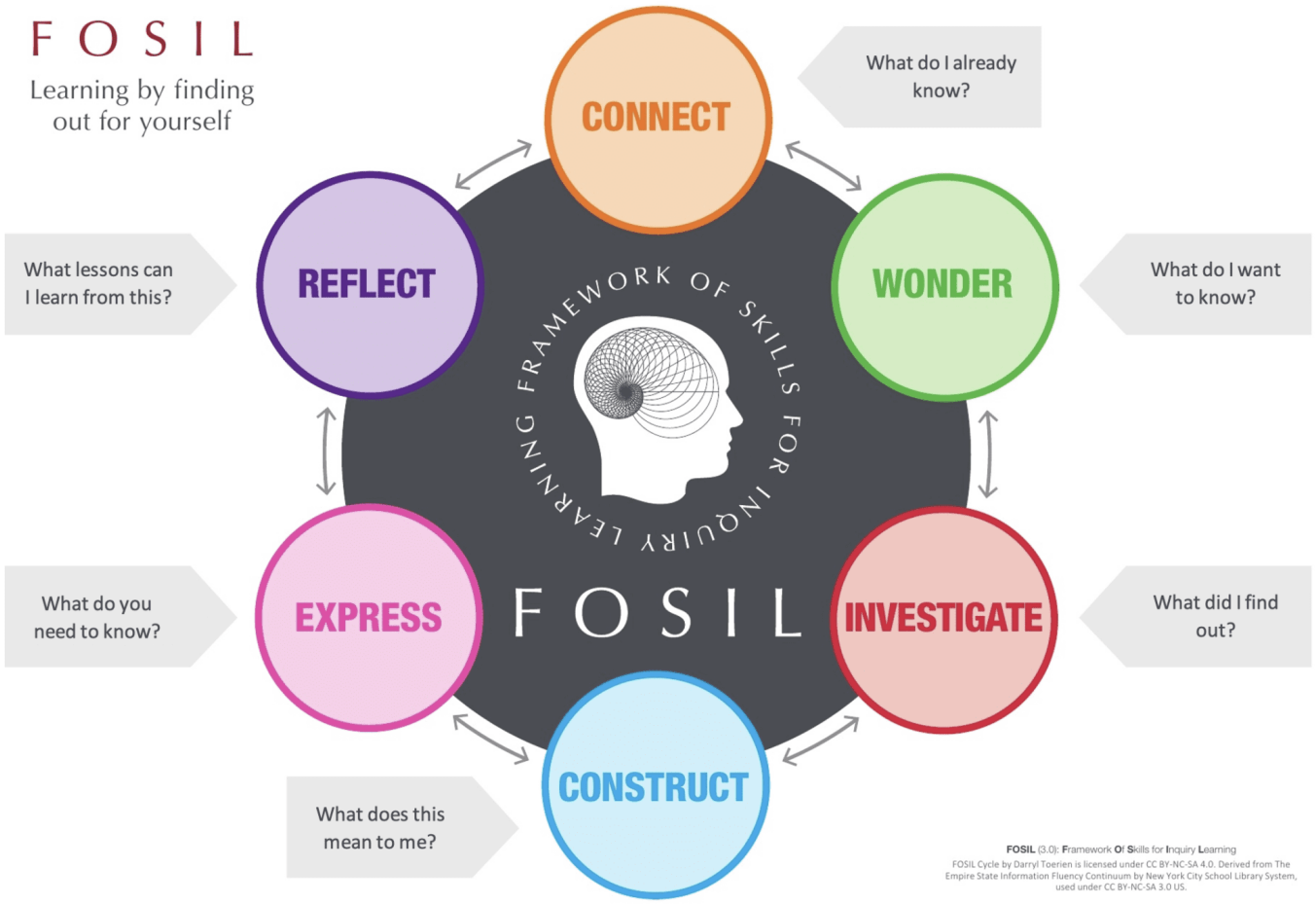


Figure 8: FOSIL Inquiry Cycle Simplified (Toerien D. , 2023)

An important development to come out of the reimagining of the ESIFC in 2019 is the high-level grouping of skills into skill sets (Figure 9 | Click here to enlarge or download as a PDF).

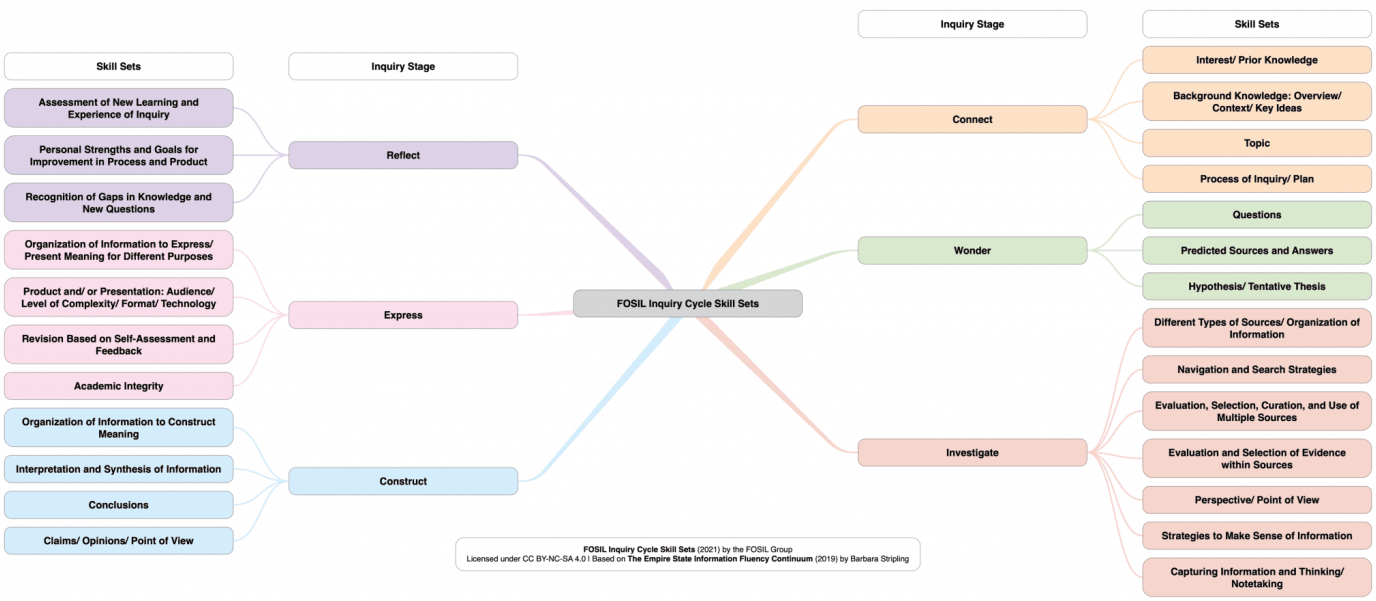


Figure 9: FOSIL Inquiry Cycle Skill Sets (Toerien D. , 2023)

This facilitates collaboration with classroom-based colleagues around the types of skills that inquiry develops or are necessary to develop systematically and progressively in engaged and empowered inquirers.

Further facilitating this collaboration is the identification of priority skills in transition years, which concentrates the full continuum of skills and provides a more accessible overview of their systematic and progressive development across the phases of school (Figure 10 | Click here to enlarge or download as a PDF).

	End of Year 2	End of Year 6	End of Year 9	Over Years 10-11	Over Years 12-13
Connect	• Shares what is known about the general topic to elicit and make connections to prior knowledge	• Generates a list of key words for a research-based project with guidance	• Revises the topic as needed to arrive at a manageable topic for a given research situation	• Identifies key words, concepts, and synonyms, both stated and implied, for topic and uses them to further research • Develops a schema or mind map to express the big idea and the relationships among supporting ideas and topics of interest • Develops and refines the topic, problem, or question independently to arrive at a worthy and manageable topic for inquiry	• Gathers context about the time period, people, and issues surrounding the topic by reading laterally across both primary and secondary sources • Explores problems or questions for which there are multiple answers or no "best" answer
Wonder	• Develops "I Wonder" questions with the class while reading or listening to texts about the research topic	• Begins to assess questions to determine which can be answered by simple facts, which cannot be answered, and which would lead to an interesting inquiry • Forms tentative thesis about main ideas with guidance • For science topics, forms hypothesis ("If . . .then" statement) that can be "tested" through research or experiment/experience	• Refines questions to guide the search for different types of information (e.g., overview, big-idea, specific detail, cause and effect, comparison)	• Refines questions to provide a framework for the inquiry and to fulfill the purpose of the research (e.g., questions to lead to historical context and interpretation; questions to elicit accurate facts about scientific problem or issue) • Plans inquiry to test hypothesis systematically or gather evidence to validate thesis	• Creates questions to lead to basic information and, in addition, to information that is more critical, complex, and diverse in perspectives
Investigate	• Sources | Recognizes the systematic way the library organizes fiction and picture books and that fiction books of interest can be located by using that organization • Evidence | Distinguishes between fact and opinion • Evidence | Begins to recognize different points of view of characters in a story • Making Sense of Information and Notetaking | With help, finds facts and briefly summarizes them via writing, drawing, or verbalization to answer basic research questions	• Sources | Evaluates print, video, and electronic sources (both primary and secondary) for relevance to the topic and credibility of author/ creator/publisher • Sources | Selects and uses an appropriate print, video, or electronic source to answer questions • Evidence | Uses navigation tools of pre-selected websites and databases to locate relevant information • Evidence | Evaluates information within a source for accuracy, relevance, comprehensiveness, and point of view • Evidence | Begins to analyze multiple points of view from multiple sources to determine similarities and differences • Making Sense of Information and Notetaking | Uses a variety of strategies to determine important ideas (e.g., looking at ideas featured in introduction and conclusion, analyzing information highlighted in boxes or charts, paying attention to the topic of each paragraph, noting the amount of supporting details for the topic of each paragraph) • Making Sense of Information and Notetaking | Uses various notetaking strategies (e.g., outlining, underlining, bulleted lists, highlighting, graphic organizers) dependent on purpose	• Sources | Uses organizational systems and electronic search strategies (key words, subject headings) to locate appropriate resources • Sources | Uses different formats (e.g., books, Websites, subscription databases, multimedia, graphs, charts, maps and diagrams) as sources of information • Evidence | Evaluates the accuracy, authority, validity, perspective, and bias of sources and information • Evidence | Reads laterally in the digital environment to discover divergent and conflicting information as well as corroborating information • Evidence | Selects high-quality information from multiple sources that answers the research questions, provides a balance of diverse perspectives, and includes both main ideas and supporting details • Evidence | Recognizes that own point of view influences the interpretation of information • Making Sense of Information and Notetaking | Identifies misconceptions and revises ideas as new information is gained • Making Sense of Information and Notetaking | Provides evidence for logical inferences based on both the explicit and implicit meaning of text • Making Sense of Information and Notetaking | Employs reflective notetaking strategies to capture own thinking and inferences about the evidence being noted in words and phrases, summarized, paraphrased, or quoted	• Sources | Uses the organizational features of a book as well as abstracts, tables, charts and first and last chapters to locate main ideas, specific supporting evidence, and a balanced perspective • Sources | Uses advanced searching strategies (Boolean operators, truncation, domain and format filters, analysis of URLs, relational searching) to broaden and narrow searches and locate appropriate resources • Sources | Evaluates the authority of a source by assessing the credentials and reputation of the author, creator or publisher, date of publication, and length or comprehensiveness • Evidence | Evaluates and selects evidence from multiple sources based on relevance and usefulness to answer research questions, currency, authority, accuracy, comprehensiveness, and point of view • Evidence | Evaluates digital information for authority, credibility, accuracy, comprehensiveness, point of view, and bias • Evidence | Analyzes the impact of point of view, perspective, and purpose of the information provided by a source • Making Sense of Information and Notetaking | Questions and challenges the text while reading or viewing to ensure comprehension and validation of accuracy and authority during the process of gathering information • Making Sense of Information and Notetaking | Takes notes using one or more of a variety of notetaking strategies including reflecting on the information (e.g., graphic organizers, two-column notes, concept maps)	• Sources | Uses search-engine organizational features (e.g., algorithm determining order of results, differentiation of sponsored content, beginning text, URL) to locate web-based information to answer research questions • Sources | Seeks information from alternative perspectives by browsing the shelves for related books, identifying people and organizations with opposing views, following links to related articles, and conducting additional searches by using key ideas and terms for alternative perspectives • Sources | Contrasts primary and secondary sources on the topic to determine commonalities and differences in point of view, comprehensiveness, and depth of specific detail • Evidence | Compares information in diverse sources to corroborate accuracy, resolve conflicting evidence, and balance perspectives • Evidence | Analyzes degrees of bias (from slightly slanted perspective to heavily slanted propaganda) and the impact of that bias • Evidence | Draws meaning from digital text by employing print literacy and inquiry skills, interpreting meaning presented through multimedia, interacting with the text, reading laterally (reading related information across multiple sites), and thinking non-linearly (using embedded links and multiple sites) • Making Sense of Information and Notetaking | Challenges ideas in text and makes notes of questions to pursue in additional sources • Making Sense of Information and Notetaking | Reflects on notes (perhaps in a reflection column) by asking questions, recording own opinions, challenging, and noting the importance of the idea for the final product
Construct	• Sorts books by fiction vs. nonfiction • Participates in discussions to draw conclusions about a topic or story	• With help, organizes notes and ideas and develops an outline, mind map, or graphic organizer • Forms own opinion or claim and uses evidence from texts and clear reasoning to back it up	• Forms opinions, judgments, and claims backed up by supporting evidence and clear reasoning	• Organizes information independently, deciding the structure based on the relationships among ideas and general patterns discovered • Draws clear and appropriate conclusions supported by evidence and examples	• Develops a line of argument or claim that incorporates and/or refutes competing interpretations or conflicting evidence with credible evidence • Builds a conceptual framework by synthesizing ideas gathered from multiple sources • Develops own opinion, perspective, or claim and supports with evidence and a clear line of reasoning
Express	• Uses writing process, emergent writing, and drawing to develop expression of new understandings • With help, makes a list of the source(s) used with title and author	• Presents information clearly so that main points and supporting evidence are readily understood by audience • Modifies and revises own work based on feedback from teacher and peers • Provides a bibliography of all sources used according to model provided by teacher	• Develops a line of argument or claim with a line of reasoning, clear supporting evidence, and attention to refuting counter arguments and claims • Creates products for authentic reasons and audiences • Cites all sources used according to local style formats	• Creates a product and presentation to present an argument, claim, point of view, interpretation, or new model most effectively for a specific audience • Cites all sources used according to standard style formats • Embeds citations to specific information, visuals, or sound when appropriate	• Drafts the presentation/product to present the line of reasoning and evidence for an argument, claim, point of view, interpretation, or new model most effectively with supporting evidence • Publishes final product for an authentic audience and real-world application • Evaluates own product and process throughout the work and uses self-assessment, teacher feedback, and peer feedback to make revisions when necessary
Reflect	• Identifies own strengths and sets a goal for improvement • With help or with the class, asks, "What do I wonder about now?"	• Reflects on new understandings, the effectiveness of the product and presentation, and the experience of the process of inquiry • Identifies own strengths and sets goals for improvement	• Reflects on own emotional and intellectual experience through the process of inquiry	• Records and reflects on individual experience of the inquiry process – the hardest part, best part, important skills learned, insights experienced, emotional highs and lows, etc.	• Identifies own strengths (academic, social, and emotional) and sets goals about specific ways to improve in the future

Figure 10: FOSIL Priority Skills in Transition Years (Toerien D. , 2022)

Most, if not all, of these skills have associated ESIFC graphic organisers, and we will link to these directly from the above document when time permits, although they can, in the meantime, be downloaded from the ESIFC website here.

It is important at this point to recall that:

> Providing a framework of the inquiry process is only the first step in empowering students to pursue inquiry on their own. The next step is to structure teaching around a framework of the literacy, inquiry, critical thinking, and technology skills that students must develop at each phase of inquiry over their years of school and in the context of content area learning.' (p. 52)

...a framework, or progression, or inquiry skills must evolve in response to changes in the environment...

This exhortation frames the concluding part of this article, which is a concise consideration of FOSIL-based Inquiry from the perspective of subject area teaching that Barbara, Jenny and I developed for the UK Great School Libraries campaign, which I include here with minor changes.

FOSIL-based Inquiry Learning

'Inquiry is a stance of wonder and puzzlement that gives rise to a dynamic process of coming to know and understand the world and ourselves in it as the basis for responsible participation on community' (Stripling & Toerien, 2021).

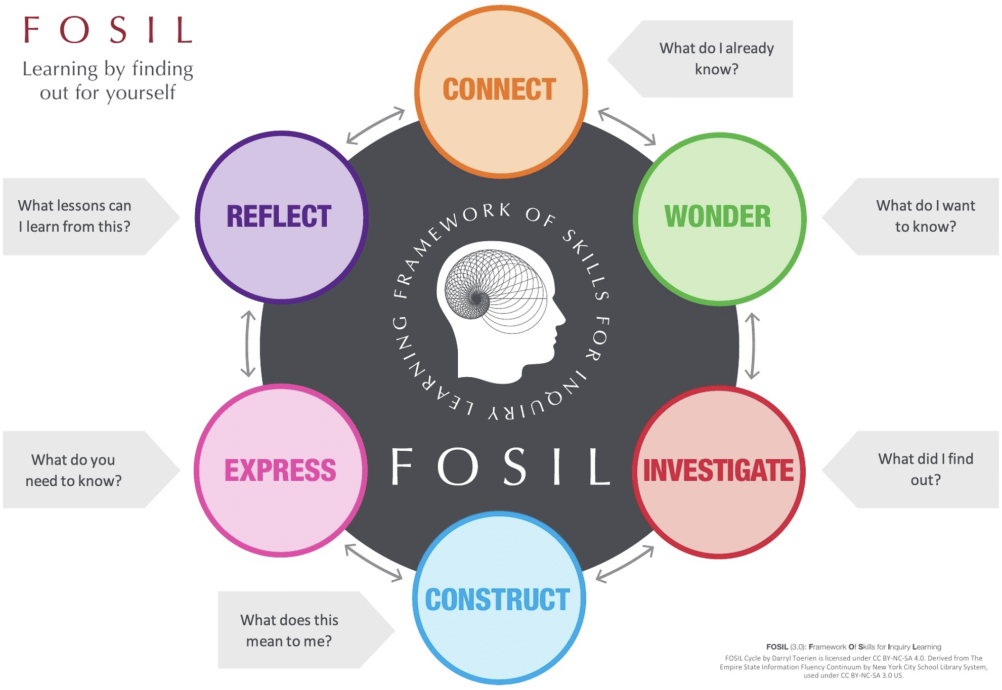
As a fundamental learning process that engages the student fully as an inquirer – metacognitively, cognitively, emotionally, socially and culturally – inquiry is characterised by students

> connecting to personal interests and a desire to know, gaining background knowledge, asking questions that probe beyond simple fact gathering, investigating answers to gather evidence from multiple perspectives and sources, constructing new understandings and drawing conclusions with support from evidence, expressing the new ideas through a variety of formats, and reflecting metacognitively on both the process and the product of learning. (Small, Arnone, Stripling, & Berger, 2012, p. 3)

The FOSIL Inquiry Cycle

The **F**ramework **O**f **S**kills for **I**nquiry **L**earning was adapted from the Empire State Information Fluency Continuum. FOSIL is, therefore, a sound instructional model of the inquiry learning process. Because this learning process emerges from a stance, FOSIL is also a mind set, which is learning by finding out for yourself. Because this learning process is enabled by skills, FOSIL is also a skill set. Because the skills that constitute this skill set need to be developed systematically and progressively, FOSIL is also tool set for doing so. Finally, because FOSIL is a collaborative inquiry into the nature and practice of inquiry learning, FOSIL is also a growing international community of inquiry.

See below. Click here to enlarge or download as a PDF



Although the inquiry process begins with the Connect stage and proceeds logically through Wonder, Investigate, Construct, Express, and Reflect, as a dynamic learning process it is cyclical and recursive rather than linear. Furthermore, while a full inquiry will include all 6 stages, inquiry-based lessons may focus on one or more individual stages, paying particular attention the skill sets and skills that undergird those stages. Finally, colour, while not always practical, further helps students to navigate the inquiry learning process.

Stages in the FOSIL Inquiry Cycle

Drawing on what you might already know to better understand what you do not yet know

Connect and Wonder are often overlooked, but distinguishing what you know from what you don't makes a huge difference at the start of the inquiry process. Less confident students can feel overwhelmed because they don't know where to start, while more confident students may be tempted to leap straight to Express without spending any time in Investigate because they think they know all the answers already.

Students can cultivate an inquiry stance – an ingrained attitude of wonder and puzzlement – by developing an awareness of themselves, their multi-faceted identities, and their personal interests and prior knowledge. Then students can be guided to use those strengths and interests as a starting point for further exploration on their own.

Consider:

- A 'brainstorming' or 'mindmapping' session at the start of an inquiry
- Asking students to find definitions for key terms in the statement of inquiry

- Allowing for a period of preliminary investigation for longer more open inquiries before asking students to narrow their focus
- Enabling students to use their own interests and personal curiosities as motivation for pursuing inquiry

Identifying those questions that will best guide your investigation

The second stage in the FOSIL Inquiry Cycle, Wonder is often skimped on by educators who know what question they want students to answer, but have not grasped how important the questioning stage is if students are to take ownership of the inquiry for themselves. Even if your inquiry has a single, overarching teacher-defined question (and some may not), an important part of engaging with the process is to help students to break that question down into a series of smaller questions that they understand how to go about looking for answers to. This is usually the point where students feel optimistic and excited, so careful work here will sustain them through Investigate where they should initially expect to feel somewhat confused and frustrated.

Students can nurture an inquiry stance when they are encouraged to follow up on their own curiosities and are guided to develop questions that fill gaps in their own knowledge and that matter to them.

Consider:

- Creating a list of questions thrown up by the original statement of inquiry together
- If working in groups, dividing responsibility for answering various sub-questions between team members
- Where students are coming up with their own inquiry question, helping them to generate questions that fit assessment criteria. It is important to explore lines of inquiry at this stage, but for more open inquiries the precise wording of the final question is only likely to emerge at some point between Investigate and Construct.
- Teaching students to develop deeper questions by asking 'What if?' 'Why?' and 'So what?'

Knowing what scholarly resources are available and being able to use them effectively

This is the stage people often identify as 'research'. The focus should be on finding relevant, age-appropriate and authoritative resources, and gathering information in response to the

broad inquiry question. This stage will often throw up new questions as students start to Construct a deeper understanding of their topic and should be characterised by a movement from 'confusion, frustration and doubt' towards 'clarity, direction and confidence' (Kuhlthau, 2004). Students are likely to need help to persevere in the initial stages.

It is vital to consider resourcing in inquiry design, and teacher / librarian collaboration has traditionally centred on this stage. A major source of frustration for students, which pushes them towards unreliable resources and to copy-and-paste answers they do not understand is a (perceived or real) lack of suitable and readily available resources.

Students can become confident and motivated to pursue future learning when they are taught social and emotional competencies along with the cognitive skills of inquiry. Students can begin to recognize, respect, and empathize with the diverse perspectives, opinions, and cultures that surround them, both within school and in the larger world. In that process of discovery, students clarify their own perspectives and develop confidence in their own ability to learn.

Consider:

- Having a quick go at the inquiry from a student's perspective well before it starts, to check that suitable resources are available and accessible
- Collaborating as a teacher / librarian instructional team before the inquiry begins to address resourcing, discuss who will teach the students how to access subject specific resources, both print and online, and discuss who will teach them how to identify a reliable source, particularly online. California State University's CRAAP test (readily available online – see also Featured Investigate Resources) can be a very useful starting point.
- Giving the class an age-appropriate Investigative Journal (see Featured Investigate Resources) to encourage them to think about how they are planning to use the information they gather and to record their sources
- Teaching students to assess their own learning throughout their investigation and enabling them to backtrack and ask new questions when their investigation leads them in new directions

Building an accurate understanding based on factual evidence

Construct is the critical stage during which information is transformed into knowledge. It is skipping or spending insufficient time on this stage and moving straight from Investigate to Express that leads to copy-and-paste answers that do nothing to advance students' understanding of a topic.

Copy-and-paste 'research' where students produce a record of facts that they may not understand and will likely not remember is a key sign that the Construct phase has been missed. This is common where the focus is on the product and not the learning experience. When students are taught to form their own opinions and conclusions based on the evidence they have found, students learn that their thinking matters. They begin to take responsibility for the validity of their ideas and are motivated to share their expertise with others. The Construct stage leads students to develop agency and empowers them to take an inquiry stance and pursue further learning on their own.

Consider:

- Not telling students what their product will be until after the Construct stage. This isn't always appropriate but can be effective in moving the emphasis from product to understanding.
- Giving students a scaffolding tool appropriate for your assessment criteria to help them to integrate all the information they have found to build a new understanding (see the Construct resources on the FOSIL Group Resources page)
- Teaching students the skills of forming opinions, drawing conclusions, and making claims

Making the most compelling case given your evidence and audience

Students are often tempted to start producing a product before they fully understand the case they are making. Once the case has been understood they need to think carefully about the target audience and the most appropriate and effective way to present their case. This is also the point at which all sources used should be carefully referenced in an age-appropriate manner.

Clarity about what is required from Express is critical, because both product and process come under close scrutiny in the Reflect stage.

Teaching students to share their new understandings effectively with their peers and other audiences incorporates the social and emotional competencies of self-confidence, agency, self-management, organization, and assessing the needs and interests of different audiences. The Express stage is when students develop their own voice and the motivation to share their voice with others.

Consider:

- Providing students with a marking rubric so that they can pre-assess their own work and make improvements before handing it in. This should include some

credit for using relevant, age-appropriate and authoritative resources and referencing appropriately.

- Giving students opportunities to pre-assess each other's work and give constructive criticism, allowing time for improvement before work is handed in
- Enabling students to be creative in their expression products and to decide the most appropriate formats based on their own expertise and the needs of the audience

Evaluating how you have worked and what you have produced

Although reflection and metacognition are encouraged at all points in the Cycle, reflection is particularly important at the end of an inquiry, both before the product is submitted for feedback (to make sure that everything that was required has been done while there is still time to make adjustments) and also after feedback has been received (to give students the opportunity to consider what they have learnt, both about the subject material and the inquiry process, and what they may do differently next time).

The Reflect stage at the end of an inquiry experience becomes valuable and robust when it leads students directly into an inquiry stance and a growth mindset. During Reflect, students are not only given the opportunity to assess their successes and challenges in both final product and inquiry process, but also the encouragement to think about what new questions they have and what they want to learn about next. They are motivated to follow their own sense of wonder and empowered to learn on their own.

Consider:

- Providing a brief reflection sheet inviting them to reflect on each stage of the process or to suggest what they would do differently next time
- Inviting them to comment on their finished product. Are they proud of what they achieved? Why/ why not? Do they understand why they got their mark? What would they do differently next time?
- Encouraging students to revisit reflections from a previous inquiry just before the start of the next
- Encouraging students to capture their new questions in a Wonder journal and pursue them whenever they wish

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FOSIL (2011, 2019) is a model of the inquiry process based on the work of Barbara Stripling as expressed in the evolving Empire State Information Fluency Continuum (ESIFC 2009/2012, 2019), which is undergirded by a PK-12 framework of learning skills – metacognitive, cognitive, emotional, social and cultural – and a growing collection of resources that support the systematic and progressive development of these skills. To support growing interest in FOSIL from around the world, Darryl established the FOSIL Group in 2019, which is an international community of inquiry centred on FOSIL, but not exclusively so, and which is free to join. This initiated a close and ongoing collaboration with Barbara Stripling in 2020, whose work on engaging and empowering students as inquirers is prodigious and profound.