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FOSIL: INQUIRY AS MIND SET, SKILL SET, TOOL SET AND COMMUNITY

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Abstract
FOSIL is, at its simplest, a model of the inquiry learning process that is based on the work of Dr Barbara Stripling as reflected in the *Empire State Information Fluency Continuum*. Because this learning process emerges from a stance, FOSIL is also a mind set. Because this learning process is enabled by skills, FOSIL is also a PK-12 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 community of inquiry. This article serves as a brief introduction to and overview of FOSIL.

FOSIL: Inquiry as mind set, skill set, tool set and community

The educational philosophy we most closely identify with is *constructionism* (Harel & Papert, 1991), which is one of a family of constructivist educational philosophies that denies the 'obvious truth' that the way to improve learning is through improving instruction (*instructionism*). From this perspective, 'learning is always a reconstruction, not a transmission of knowledge' (Psenka, Kim, Okudan Kremer, Haapala, & Jackson, 2017, p. 9), and is, therefore, fundamentally an epistemological concern.

Constructionism does not call into question the value of instruction as such, nor is it dismissive of teaching because it is minimalist; rather the goal is to teach in such a way as to produce the most learning for the least teaching (Papert, 1993, p. 139). However, this cannot be achieved simply by reducing the quantity of teaching and leaving everything else unchanged. This requires a paradigm shift in the full sense of Thomas Kuhn's use of the term (1996):

> *On the one hand, [paradigm] stands for the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community [sociological]. On the other, it denotes a sort of element in that constellation, the concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as a basis for the solution of the remaining problems of normal science [exemplary past achievements].*
> (p. 175)

We believe that this educational philosophy is best served by an inquiry-based pedagogical approach, which is at odds with the transmission-based pedagogical approach that persists in most schools in the UK. This creates a twofold problem. Firstly, on a theoretical level, inquiry is grossly misunderstood, a situation aggravated by opposition to inquiry that is often ideological. Secondly, on a practical level, creating and sustaining the conditions for effective inquiry requires, amongst other things, effective collaboration between professionals in an environment that is often hostile to collaboration, especially between teachers and librarians.

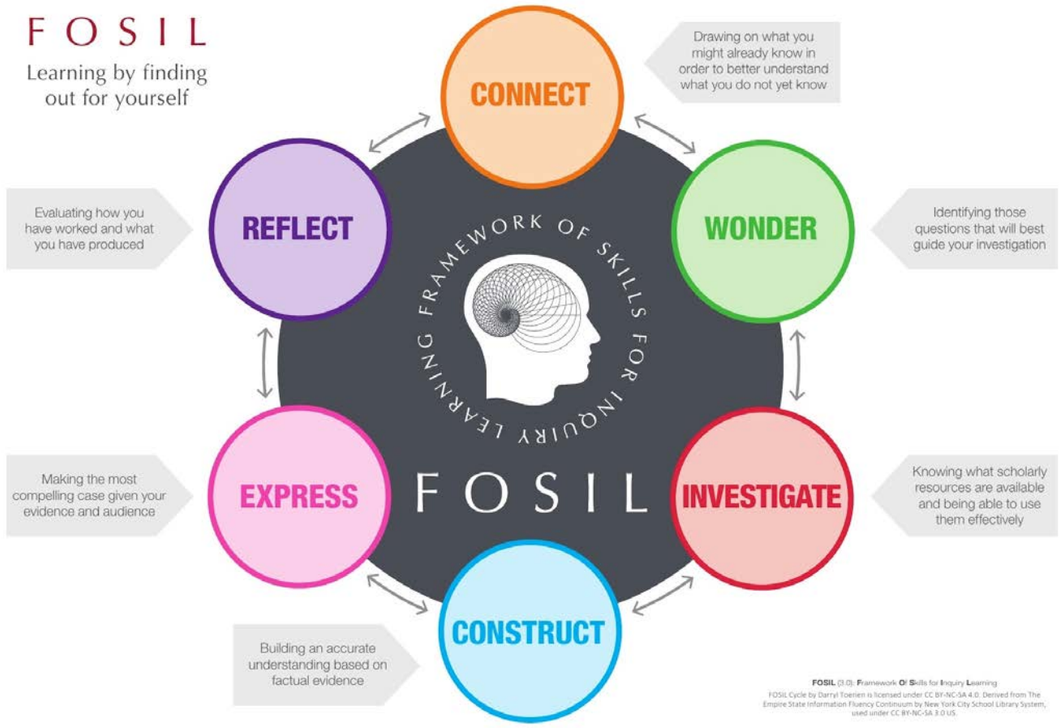

Figure 1: FOSIL Inquiry Cycle

This twofold problem requires a complex response, at the heart of which lies a reimagined model of professional collaboration that is authentically child-centred in focus and empowering in intent - a response that is urgently needed if we are to equip our children for their future, a future that we have made more challenging and less certain.

FOSIL is such an evolving response.

See Figure 1: FOSIL Inquiry Cycle

FOSIL is the result of trying to solve two specific problems at Oakham School within the International Baccalaureate (IB) Diploma Programme (DP) relating to the Extended Essay (EE), which is a mandatory independent, self-directed piece of research, finishing with a 4,000-word paper (International Baccalaureate Organization, n.d.).[1]

Firstly, how to effectively prepare our students for the demands of the EE, specifically how to accurately cite and reference according to a standard style, when, for the majority of them, their education at school up to that point would not have required work of this nature. This led to what we thought was a framework of information literacy skills, but, serendipitously, turned out to be a PK-12 (age 4-18) framework of inquiry learning skills and accompanying model of the inquiry learning process – *The Empire State Information Fluency Continuum*, or ESIFC, which was developed by the School Library Systems Association of New York State under the leadership of Barbara Stripling (2019) – which led directly to FOSIL, and is what FOSIL is based on (Toerien, 2019). According to the ESIFC, which was then in use in schools throughout New York City, citing and referencing was a priority skill in Grade 5 (Cites all sources used according to model provided by teacher), Grade 7 (Cites all sources used according to local style formats, which we took to mean a house style) and Grade 10 (Cites all sources used according to standard style formats). The immediate consequence of this was deciding on APA as our standard style format as well as our house style, which we teach from Grade 5 through to Grade 12.

Secondly, how to more effectively support the EE out of a deeper understanding of the inquiry process? This was motivated by a sense that our EE timetable, which in many respects was exemplary, worked against the inquiry process at certain key points because it was driven primarily by administrative concerns. The clearest example of this was the requirement for a research question to start the process rather than allowing the research question to emerge from the process at an appropriate point. This led us to Carol Kuhlthau's Information Search Process (Kuhlthau, n.d.), which, in adding a more explicit affective, cognitive and physical dimension to our emerging understanding of the inquiry process, not only allowed us to realign our EE timetable to reinforce the inquiry process, but also helped identify points of optimal intervention in support of the EE process (see below, which also reflects our current alignment of our EE timetable with our growing understanding of Kuhlthau's ISP and the ESIFC/ FOSIL).

See Figure 2: Combining insights from the ISP with FOSIL

It must be noted that we are not combining the ESIFC/ FOSIL with Kuhlthau's ISP, only that we are trying to respectfully combine insights that we are gaining into the inquiry process from two highly regarded bodies of work, for which we are very grateful.

Having set out to find a framework of information literacy skills, and having serendipitously stumbled into a model of the inquiry process *along with* a PK-

1 It should be noted that inquiry is a curriculum stance that pervades all IB programmes (Tilke, 2011, p. 5), and which reaches its apotheosis in the EE. It should be further noted that since 2001 the IB DP has been offered to students as a choice of school-leaving qualification at Oakham School alongside traditional A-levels, both of which are preceded at Oakham School by GCSEs – neither A-levels nor GCSEs would be characterised by an inquiry stance, let alone pervaded by one.

FOSIL Stages and ISP Tasks	Connect	Wonder	Investigate		Construct	Express	Reflect
	Task Initiation	Topic Selection	Topic Exploration	Focus Formulation	Information Collection	Presentation	Assessment
Feelings (affective)	Uncertainty	Optimism	Confusion, frustration *and doubt*	Clarity	Direction *and confidence*	Relief *and satisfaction or disappointment*	Sense of accomplishment
Thoughts (cognitive)	Vague			Focussed	Increased interest		Increased self-awareness
Actions (physical)	Seeking *relevant information* *Exploring*				Seeking *pertinent information. Documenting*		
EE Timetable	EE Seminar 1 Supervisor Application Form	Research Proposal	EE Seminar 2 IT Workshop 1 Work through subject-specific LibGuide and arrange to meet librarian if necessary EE Investigation Days	Finalise research question Formulate thesis statement	Gather evidence to support thesis	EE Seminar 3 (including IT Workshop 2) EE Writing Days	Culminates in Viva Voce

Figure 2: Combining insights from the ISP with FOSIL

12 framework of inquiry skills, we found ourselves increasingly turning our attention to the inquiry process as an approach to learning, and teaching for learning.

Barbara Stripling (2017) accurately describes the situation that we found ourselves in:

> *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 distinguishing feature of the ESIFC, and by extension FOSIL, is the combination of a sound instructional model of the inquiry process – Stripling's Model[2] – and a highly detailed PK-12 framework of these literacy, inquiry, critical thinking, and technology skills, initially developed in 2009 and re-imagined in 2019 'to adapt to the changing information, education, and technology environments, as well as the increasing diversity in our student populations' (Stripling, 2019). The ESIFC encompasses more than the inquiry process - Inquiry & Design Thinking, Multiple Literacies, Social & Civic Responsibility, Personal Growth & Agency - but as that would require an article of its own, we will include here only the skill sets that enable the inquiry process.

See Figure 3: FOSIL Inquiry Cycle Skill Sets

Because the skills that make up these skill sets need to be developed systematically and progressively, priority skills in the ESIFC are accompanied by graphic organisers, which serve both instructional and formative assessment purposes, and which are a further distinguishing feature of the ESIFC, and by extension FOSIL. Graphic organizers for priority skills are available from the ESIFC website by Grade or by Standard, and were the starting point for FOSIL-based graphic organizers, which employ colour for instructional purposes, and which is a distinguishing feature of FOSIL.

See Figure 4: FOSIL-based Graphic Organizer for A-level Politics

While serendipity may have had a hand in leading us to the ESIFC, adopting and adapting it was a deeply considered choice.

2 For insight into the development of this model, see *E&L Memo 1 | Learning to know and understand through inquiry* by Barbra Stripling (2020) on the FOSIL Group website.

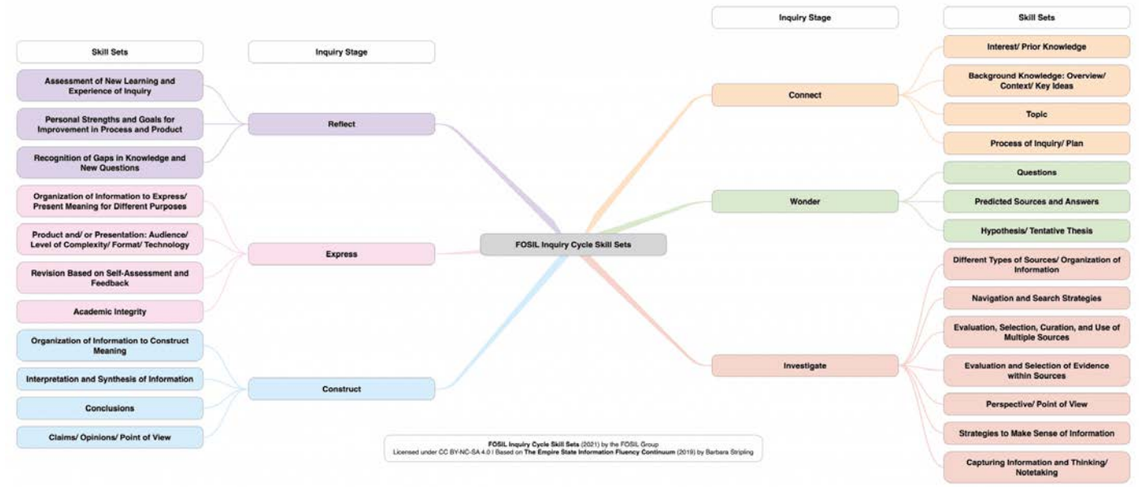

Figure 3: FOSIL Inquiry Cycle Skill Sets

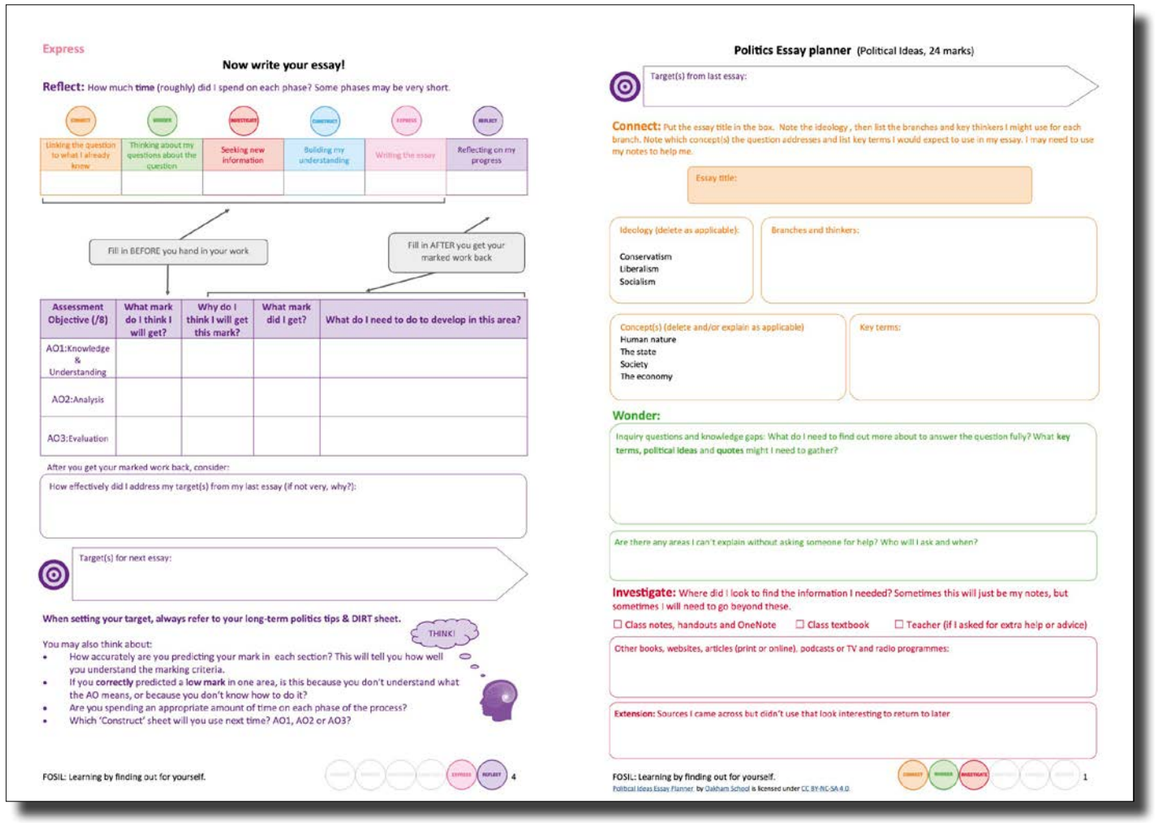

Figure 4: FOSIL-based Graphic Organizer for A-level Politics

The three main reasons for choosing Stripling's Model/ ESIFC were:

- The stages of Stripling's Model – Connect, Wonder, Investigate, Construct, Express, Reflect – are thoughtfully named and make obvious logical sense, and are therefore easy to remember, even for young children.

- The highly detailed and clearly thought out 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 that enables the inquiry process. The 2009 framework of FOSIL skills is available from the FOSIL Group website - https://fosil.org.uk/fosil-cycle/skills-framework/ - and we have almost completed the process of updating this to reflect the reimagined 2019 ESIFC framework, although the 2019 ESIFC framework of skills can be found on the ESIFC website - https://slsa-nys.libguides.com/ifc/continuum -.

- Both Stripling's Model and the underlying framework of skills as expressed in the ESIFC are available under a CC BY-NC-SA 4.0 licence, without which it would not have been possible for us to develop and share FOSIL, which is on ongoing effort to respectfully transplant the ESIFC in foreign soil. I am delighted to say that this effort, which stretches back to 2011, has received an original maker's mark, with FOSIL being reciprocally endorsed by the School Library Systems Association of New York State in April 2020 and Barbara Stripling commending the FOSIL Group website, which was formed in April 2019 to support ongoing development and increasingly widespread use of FOSIL, for its 'clear and elegant presentation of inquiry'. Barbara has since joined the FOSIL Group, and we are closely collaborating on its ongoing development.

Having found in Kuhlthau's ISP a powerful tool for solving a different set of problems it would have made no sense to completely abandon the ISP, which is where our work on sensitively combining the insights of the ISP with FOSIL began. However, growing understanding of Stripling's Model in relation to the full ESIFC combined with close collaboration with Barbara is revealing the extent to which aspects of the inquiry learning process that are more explicit in the ISP are actually present in the ESIFC. This highlights the fact that no model of a complex and dynamic process is perfect in its explanatory power, which means that all models have relative strengths and weaknesses, which is why the *IFLA School Library Guidelines* (2015), which frame learning through inquiry, contain a caution:

> *Creating models for inquiry-based learning involves years of research, development, and practical experimentation. Schools without a model recommended by their education authority should select a model that aligns most closely with the goals and learning outcomes of their curricula, rather than attempting to develop their own models. … Where there is no locally or nationally developed model for inquiry-based teaching and learning, a school librarian should work with the classroom teachers and school leaders to select a model. As the teachers and students apply the model they may wish to adapt the model to serve school goals and local needs. However, caution should be exercised in adapting any model. Without a deep understanding of the theoretical foundations of the model, adaptations may eliminate the power of the model.*
> (pp. 41-43)

FOSIL is a case in point, now 10 years in the making.

School librarians in the UK are highly unlikely to have been teachers before becoming school librarians, and of those school librarians who are professionally qualified, none will have been able to do so in the UK with a specialisation in school librarianship. Against this backdrop, FOSIL started out as a relatively modest undertaking, which was simply as a **F**ramework for **O**akham **S**chool **I**nformation **L**iteracy – that is, a framework of information literacy skills, and the ESIFC's Creative Commons licence allowed us to do that.

However, it soon became clear that a growing number of colleagues at other schools – librarians, teachers, senior leaders – were on a similar journey, and that interest in FOSIL was far more widespread than Oakham School, and even the UK. This interest in FOSIL beyond Oakham School, combined with the fact that what we were actually developing was a framework of the inquiry process and associated skills rather than a framework of information literacy skills, afforded us the opportunity to more accurately reflect what FOSIL was in its name, and, happily, **F**ramework **O**f **S**kills for **I**nquiry **L**earning turned out to be exactly what FOSIL had been all along.

Had we not proceeded from an inquiry stance, resolutely committed to making sense of where the inquiry process was leading us, and with the means to do so, we would likely have lost our way between a framework of information literacy skills and a sound instructional model of the inquiry process undergirded by a highly detailed framework of inquiry learning skills, thereby eliminating the power of Stripling's Model/ ESIFC.

This had the added benefit that colleagues elsewhere could adopt/ adapt FOSIL without them *needing* to rename it. The history of FOSIL in Guernsey is a case in point, when it was successfully transplanted it in 2013 as CWICER – **C**onnect, **W**onder, **I**nvestigate, **C**onstruct, **E**xpress, **R**eflect – following a serendipitous meeting between the authors in 2011. A similar thing happened in 2015 with Alison Tarrant, now Chief Executive of the UK School Library Association but then Librarian at Cambourne Village College, where FOSIL 'became' Stripling's Model. While Elizabeth and Alison, for example, had done exactly what Darryl had done, it became clear to us very quickly, then, that we actually needed to be constructing a *shared* vocabulary around inquiry, because, as Deborah Levitov (2016) warns, standardisation of inquiry language is an important step *if* all educators are to share a common understanding, and without which effective collaboration between librarians and teachers is simply not possible (p. 30). The far-sighted decision to rename FOSIL, as well as the subsequent and inevitable formation of the FOSIL Group - https://fosil.org.uk/ - in April 2019, must be noted in the historical record, because without these the rapid expansion of FOSIL beyond Oakham School, as reflected in the FOSIL Group, would not have been possible. Subsequent developments in Guernsey serve to illustrate this, with CWICER renamed as FOSIL, and the extent to which this then both enabled more effective collaboration between librarians and teachers in Guernsey, while also broadening that collaboration through the FOSIL Group to include librarians and teachers from beyond Guernsey.

It has been said, possibly by Leonard Sweet, that a community is the stories that it tells and the songs that it sings. A concluding distinguishing feature of FOSIL is the community of educators who, in the Forums of the FOSIL Group, are humbly telling stories and singing songs that counter Ivan Illich's charge that the principal lesson that school teaches is the need to be taught (1971). In doing so, we add our stories and our songs to the broader community of educators labouring toward an educational reality in which the library does not support the classroom, but rather in which the classroom leads … inevitably and essentially to the library (Beswick, 1967, p. 5). This educational reality does not value the library over the classroom – rather, it acknowledges that we can't teach our students everything that they need to know, and so the best that we can do is position them where they can find what they need to know when they need to know it.[3] And this, in turn, requires reimagined professional collaboration between classroom and library that is truly empowering for our students as 'self-directed learners, lifelong and life-wide' (Oberg, 2017, p. 4).

3 Widely attributed to Seymour Papert, Professor Emeritus in the Media Lab at MIT, who led its Epistemology and Learning Group, later the Future of Learning Group.

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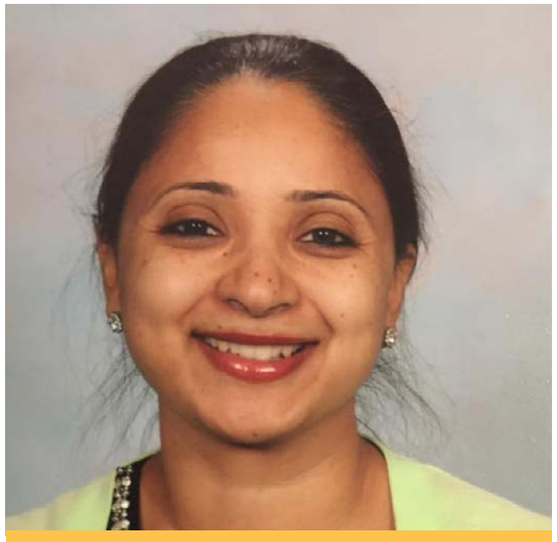
SECONDARY TEACHER LIBRARIANS IN TRAINING REFLECT

This is Part 2 in a series highlighting the learning of Teacher librarians (TLs) graduating from the Charles Sturt University degree, Master of Education (Teacher Librarianship). The first part appeared in the March issue of Access. This part highlights themes chosen by secondary TLs.



POOJA MATHUR

Pooja Mathur is a TL, (TL) Reading Club Coordinator and member of the well-being team at The King's School (TKS) in Sydney. She is an active member of the Management Committee of the School Library Association of NSW.

Pooja on student-centric collection development, management and access:

The subject, ETL 503 – Resourcing the Curriculum - introduced me to several new and essential concepts regarding library management and the TL role. Being a novice, I was unaware of the existence and importance of library collection development and management policies as well as the school library's annual report (LaGarde, 2017). Such policies not only ensure transparency in selection and deselection (Johnson, 2014, p. 195), they help in allocation of funds, are advocacy tools and most importantly, they prove and highlight the reflection of school's priorities in the library's planning and program implementation (NSW Department of Education, 2015). I learnt that collection analysis data from library management systems (like Oliver, Infiniti, Destiny etc) can be used to affirm the library collection's strengths and areas for improvement (Hart, 2003).

I also learnt about Ranganathan's laws of library science (Haider, 2017), numbers four and five of which taught me that location and access to resources in a library must be always easy, simple and quick, and that libraries are undergoing constant growth and change. Hence, as I worked through ETL 505 – Describing Educational Resources - and developed my understanding of Web Dewey, School Catalogue Information Service (SCIS) and Resource Description and Access (RDA), I investigated alternate shelving and cataloguing concepts such as controversial and oft-debated Genrefication or book-store method. I have worked with Dr. Laycock, Head of Information Services at TKS to genrefy the fiction collection in order to strengthen the wide reading culture across the senior school. The process was carefully planned, beginning with a survey of middle school students, conversations with colleagues and students, leading to the development of genre categories. The practical tasks of genrefying were also carefully planned and carried out, and the impact on student borrowing will be closely watched.