



Educating Effervescent Women Scientists through Lucy Maud Montgomery's *Anne of Green Gables*

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Abstract: The series *Anne of the Green Gables* is sequential children books that focus on Anne Shirley, the story's protagonist. The series of books explore Anne's life from a girl to a charming pretty young lady. In the story, Anne is portrayed as an inquisitive young girl. She explores her life philosophically. She also explores many aspects of nature and its relation to science. Her inquisitiveness is extremely sharp, that the skill helps her in learning the science of everyday life. The paper discusses Anne of the Green Gables' use in educating female students to enjoy STEM education. At present, the proportion of women engineers in Malaysia is disproportionate, and the Ministry of Education is working on inculcating female students' effervescence in STEM subjects. The methodological framework utilised in this study adhered to the approach of the phenomenological case study's paradigm. Interviews were conducted, and qualitative data were gathered and analysed using Atlas.ti, a qualitative data analysis software. The findings indicated that female students could draw links between themselves and Anne, the protagonist in the novels. The protagonist's various occupational explorations helped female students understand that they can excel in STEM and arouse their interests to become scientists or engineers. In conclusion, the use of literary texts written by female authors such as *Anne of Green Gables* could draw attention from female students towards STEM. This study fills the gap in the existing literature where no scholars have used the classic *Anne of Green Gables* to illicit interests among young female students.

Keywords: STEM education, KBSM Malaysia, *Anne of Green Gables*, women scientist, children literature

1. Introduction

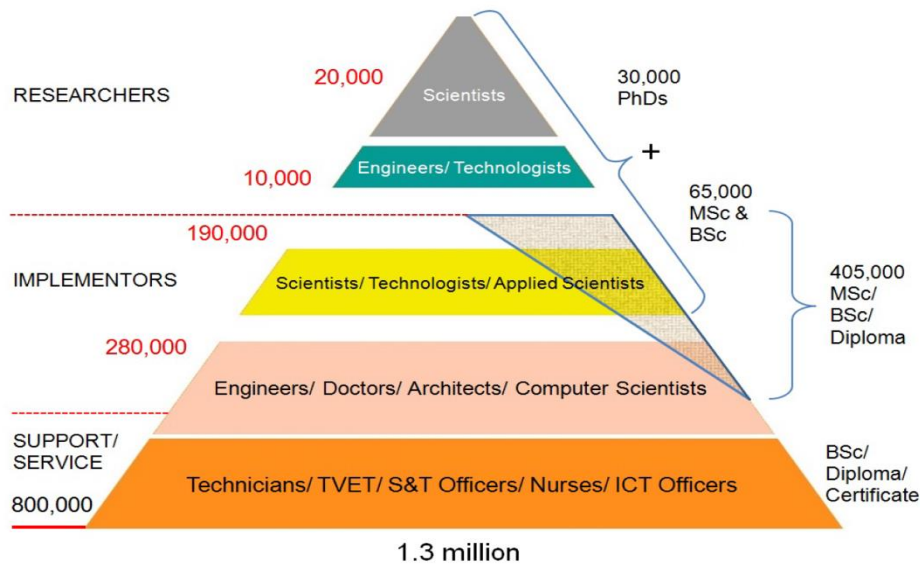
Lucy Maud Montgomery OBE was born on November 30, 1874, and passed away on April 24, 1942. She is a well-known Canadian writer famous for children literature. She has published six novels based on the main protagonist, Anne Shirley. The series trace Anne Shirley's life journey from a kid to a young lady. These novels are (*Montgomery, Anne of Green Gables*, 2020 [1908]), (*Montgomery, Anne of Avonlea*, 2011 [1909]), (*Montgomery, Anne of the Island*, 1983 [1915]), (*Montgomery, Anne of Windy Poptars*, 1984 [1917]), (*Montgomery, Anne's House of Dreams*,

1992 [1936]) (Montgomery, Anne of Ingleside , 1984 [1939]). Montgomery died shortly after the publication of her last novel. She remains famous, especially for children literature. She also remains a huge inspiration to many generations of girls (McCoy, 2018) Lucy Maud Montgomery's first novel, *Anne of Green Gables*, is comparatively and arguably the most successful piece of all (Lowne, 2020). Montgomery's *Anne of Green Gables* is famous in the domain of children literature is probably, or arguably due to the main protagonist, Anne. Anne Shirley is one of the most iconic characters in all children's literature. It describes what an intelligent girl can do with her life. Pursuing a dream is not solely a male-dominated activity. It breaks the subordinate normalcy and traditional ideology, which can impede a girl's pursuit of happiness. (Simons, 2009). Hence, the text serves as an appropriate text for female students to go after their dreams. The use of literary text in teaching engineering students is not uncommon. One classical publication that deals with such aspects are the paper discusses poetry in engineering education (Millan, 1996). A comprehensive study about literature and STEM education has also been discussed, but it only focuses on technical writing and not gender disparity (Alikhani, 2018). Anne of Green Gables' use of promoting girl's education was reported in Japan by Collins, where the result shows that Japanese students were inspired by this novel (Collins, 2012). This serves as a point of departure for this paper. This paper focuses on promoting girls' interests in studying for STEM.

2. Literature Review

This paper presents a way of inculcating female students' interest in STEM education through literary texts. Representation of professional females in literary works is uncommon, especially in classical works. However, several publications have detailed out such representation, which can bring about STEM interests. One such work is by Jenny Davidson from Columbia University, who studied Maria Edgeworth's *Patronage* concerning jobs and professions (Davidson, 2004). In this paper, Davidson outlines how Edgeworth's portrayal of professional females sparks interests among female students. Other works, such as the study of George Eliot's *The Mill on the Floss* regarding hydrology and hydrometeorological hazard, have also been reported (Ahmad Zufrie Abd Rahman, Chong, Zeitley Karmilla Kaman, & Leon, 2020).

Let us now shift our discussion to STEM. STEM education is gaining momentum in the current Malaysian education landscape. However, female students interested in STEM are far too few compared to their male counterparts. This gender inequality creates societal, cultural and economic issues. The issues could have a long term impact on society at large. Thus, the Ministry of Education has developed a policy on promoting female students to involve in STEM education (Ministry of Education, 2012).



Source: Kementerian Pendidikan Malaysia (KPM), *Laporan Strategi Mencapai Dasar 60:40 Aliran Sains/Teknikal: Sastera, 2021, pg. 5*

Fig. 1 - Science and technology human capital roadmap: towards 2020

The policy is aimed to have more female professionals working in the STEM domains. Several strategies have been developed to achieve this balance. Liberal education is one of the pillars to reinforce the girls' interests in STEM. A student's educational experience influences her ambition (Rajasekaran, Karthikeyan, Chong, & Karunakaran, 2019). Issues about empowering the girls, especially in the Asian context, have been hotly but endlessly debated.

Liberal arts such as English subject also plays a role in promoting STEM. This has been reported where the researchers opined that social sciences subjects play a pivotal in promoting STEM (Chong, Ng, Loh, & Ahmad Zufrie Abd Rahman, 2019). Philosophically, the language subject's values are enormous in its contribution to society (Small, 2013). It is pivotal to emphasise that this paper does not frame its discussion on any feminism ideas such as Kristeva (Kristeva, 1991), Irigaray (Irigaray, 1992) and Butler (Butler, 2006). It is, however, framed within a larger educational and gender equality philosophy.

3. Methodology

This study was conducted at a missionary school. It is a convent school in the northern part of Malaysia. The name of the school, teachers, and students is to remain anonymous according to the Personal Data Protection Act Malaysia's observation. The school selected because the school includes literature in English (Subject code: 2205) as a compulsory subject for all form 4 and form 5 students. The school has been offering Literature in English subject since the very first day of its establishment. The first few teachers were the Catholic nuns and the De La Salle brothers. The school has been keeping its tradition ever since. It is also important to note that the official name for the literature subject is named "Literature in English" in the study. It used to be called "English Literature". Some people preferred to call it simply "Literature". For ease of reference, this paper uses the terms interchangeably to help manoeuvre the discussion. More discussion on this issue can be found in the classic written by Carter and Long (Carter & Long, 1991).

Miss Patricia Joseph (not her real name) has been teaching English literature at this convent school for about 15 years. Her academic background is in English literature. She obtained an honours degree from the University of Malaya. It is important to note that the English literature programme at the University of Malaya is singular in its historical journey. It distinguishes itself from other programmes in all Malaysian universities because it is the oldest in Southeast Asia as well as having the same root as the English programme at the National University of Singapore before Malaysia gained its independence in 1957 (Lim & Yoshihara, 2007) (Abu Bakar A Hamid, et al., 2009). The English degree from this university is also the only one that focuses on literature.

A detailed description of the teacher is fairly important to emphasize that the teacher has sufficient knowledge in teaching English literature. There are several reasons for this justification. The first is that the current TESL programmes throughout Malaysia have some cursory approaches to literature. Secondly, only the University Malaya English programme covers a comprehensive range of literary works. Other university programmes offer a degree with a combination of linguistics, language, TESL, education, etc. Since the gamut of this study uses English literature to promote STEM to girls in a girl's school, the selection of the school, teachers, and students is reasoned in the most circumspect way.

About the student participants. The school was chosen due to its historical background and current practice. It is one of the very few schools that still offer English literature at SPM (the Malaysian national examination equivalent to the IGCSE O' level). Hence, presumably, the students have a better command of English against their cohort in other schools. This is because the school's origins were a missionary school, i.e., a convent school. Details about the historical development of missionary schools can be found in (Tan, Mission schools of Malaya, 2011) and (Tan, Mission Pioneers of Malaya: Origins, Architecture and Legacy of Our Pioneering Schools, 2015).

The contribution of the mission schools is undeniable. These mission schools have produced many women in the STEM domains. Many Malaysian women engineers and scientists were once students at missionary schools. These schools have produced many world-renowned STEM experts serving in various domains and capacities (Curriculum Development Division, Ministry of Education Malaysia, 2016).

In terms of methodological framework, it is important to note that the framework is eclectic. The methodological framework is framed within the phenomenological studies. The phenomenological studies paradigm focuses on exploring experiences (Smith, Flowers, & Larkin, 2009). In the classroom research, excerpts from the novels were discussed with the students. The researchers video-recorded all the discussion sessions. The researchers then interviewed the teacher and several selected students using the snowballing methods.

4. Findings and Discussion

The analysis themes are enormous due to the nature of the subject, which is a literary text. It gives freedom for the students to imagine and speak their mind. This section discusses two major themes on how Anne Shirley's profession inspired the female students upon reading the excerpt in the class.

Firstly, it is about inspiring female students to love geological engineering. When the following excerpts were first given to the students, they were awed and amazed about stones. They raised many questions about stones and how climatic differences shaped the morphology of the stones. The researchers asked the students to read and make a critical criticism about the following excerpt (Montgomery, Anne of Green Gables, 2020 [1908]);

The shore road was "woody and wild and lonesome." On the right hand, scrub firs, their spirits quite unbroken by long years of tussle with the gulf winds, grew thickly. On the left were the steep red sandstone cliffs, so near the track in places that a mare of less steadiness than the sorrel might have tried the nerves of the people behind her.

Down at the base of the cliffs were heaps of surf-worn rocks or little sandy coves inlaid with pebbles as with ocean jewels; beyond lay the sea, shimmering and blue, and over it soared the gulls, their pinions flashing silvery in the sunlight. (Montgomery, Anne of Green Gables, 2020 [1908]) (Excerpt 1)

The students picked up the lexical choices about the description of stones and how stones foreground and relate to the environmental landscape. This inquiry line opened up their inquisitiveness about other related topics, such as Malaysia's history as a seafaring nation, the littoral and rural lives of the olden days, among other things. They made links and connected the dots among many things such as rocks, landscape, habitat, sustainability and urban planning. The students could discuss the ideas synchronically and diachronically along the axis of spatial and temporal domains.

Indeed, the reading of this excerpt responds to the broader cultural preoccupations proper to our cultural setting and norm. Critical reading, which encourages students to concentrate on the words on the page (to use I.A Richards' words), is generative. The students are attentive to history, politics, the natural sciences, career development, among other things. As such, the accuracy of the geological information is irrelevant. This echoes the idea expounded by Rosenblatt that the students' attentions are on what they are experiencing, thinking and feeling and disregard the inaccuracy of the information written in the text (Somer, 2020), (Rosenblatt, 1995).

Most importantly, the students were amazed that the main protagonist, Anne Shirley, finds interests in stones. The protagonist successfully inspired the students to reach their wildest dreams to become a geologist or a geological engineer. Students then were guided by the school counsellor to learn about career development in geological engineering and higher institutions that offer this course. Unsurprisingly, the students were more interested to know about Canada and Canadian universities, along the way of exploring their future endeavour. Undoubtedly, the joy of the girls after the class discussion is a metamorphosis. It transformed their spirit and ambition. Finding one's interest is like finding one's home. Such analogy defines how home situates a sense of freedom. Such an idea has been explored by Leon (Leon, 2009).

Secondly, environmental engineering. Anne of Green Gables, Anne of Avonlea, follows the same protagonist from being an undergraduate student to her later stage, where she became an environment enthusiast. In the story, she founded the A.V.I.S. (the Avonlea Village Improvement Society) to promote Avonlea's landscape. Below is the excerpt:

"Oh, we are not going to try to improve the PEOPLE. It is Avonlea itself. There are lots of things which might be done to make it prettier. For instance, if we could coax Mr. Levi Boulter to pull down that dreadful old house on his upper farm wouldn't that be an improvement?"... "That old ruin has been an eyesore to the settlement for years. But if you Improvers can coax Levi Boulter to do anything for the public that he isn't to be paid for doing, may I be there to see and hear the process, that's what. I don't want to discourage you, Anne, for there may be something in your idea, though I suppose you did get it out of some rubbishy Yankee magazine; But there, I know you'll go ahead with it if you've set your mind on it. You were always one to carry a thing through somehow." (Montgomery, Anne of Green Gables, 2020 [1908]) (Excerpt 2).

When the students read this excerpt, they were asked to imagine a perfect home. The researchers had a project for them to be completed within a month. The girls were tasked to use multimedia to reflect on their thoughts. They were asked to produce two pictures of the images. These images were the images of before and after the improvement of Avonlea, as described in the excerpt.

The students were very eager to use a computerised mechanism to illustrate their ideas, thoughts and creativity. Many of the students even went further to search for Computer-aided design software and learn about how the software could help them produce a more realistic and vivid representation. Preliminary findings were reported (Chong, Ng, Loh, & Ahmad Zufrie Abd Rahman, 2019). Unpacking and unloading the lexical choices stipulated semantic networks that are generative and transformative to the cognitive manifestation. This helps in the construction of the ways the students construe the worldview. The students used their imagination to illustrate their ideas of a perfect place to live in by incorporating issues related to a sustainable environment.

However, at the end of the novel, Anne Shirley did not become an engineer or scientist. She lived a normal life succumb to their traditional role of a lady, although she is intelligent and wins a scholarship to university. Her life is framed within the cocoon and lagoon of a traditional male-dominated scenario (Ang, 2000). This domicile idea quickly sparks the students' interest in debating gender equality and what the world can do to promote a healthy work-life balance for future scientists.

The students were amazed at the different jobs and professions portrayed in the novels from other related excerpts given in class. Several other descriptions about cleaning wounds, distinguishing fire, generating electricity, building machines used in the farms, medical sciences and many more. However, these were not reported here as this paper only focuses on major themes generated from Atlas. Ti.

Upon completing the intervention sessions, the students were interviewed again. Many of the students cited the idea of self-awakening. The students have also mentioned that these awakening are indeed an eye-opener towards an effervescent STEM learner. Such awakening is mesmerised by the girls who could see that they could be the inventors

of electricity and other scientific innovations. In fact, after the class discussion of this excerpt, almost all students somehow showed interests in either electrical or electronics engineering. Again, awakening among students can be tunnelled through a conduit through literary text (Gabriel, *Compelling Story of Female Awakening: Indrani Aikath-Gyaltzen's 'Daughters of the House'*, 1994).

5. Conclusion

Children literature has gained momentum in the Malaysian literary landscape. (Sharifah Aishah Osman & Tutu Dutta, 2019). The sojourn of female-themed children literature can be considered as a national heritage. This echoes Gabriel's idea of the "agential activity of making heritage" (Gabriel, *Making Heritage in Malaysia: Sites, Histories, Identities*, 2020). The futures of children literature, especially in a postcolonial nation, could be a modus operandi in promoting STEM to girls (Gabriel & Wilson, *Asian Children's Literature and Film in a Global Age: Local, National and Transnational Trajectories*, 2020).

The researchers recommend that future research can use Asian texts such as (Sharifah Aishah Osman & Tutu Dutta, 2019) to tea literature and promote STEM among girls. Using such text conjures a sense of belonging and could yield a more approachable and sensible lineage among students. Girls are encouraged to partake in a profession that is heavily male-dominated (Ang, 2000). This is the foregone suggestion of this project.

Thus, many ways of promoting STEM to girls resemble prismatic approaches, which can hopefully yield some promising result. This is pivotal for a young nation like Malaysia to be at the forefront of STEM education. Nonetheless, more efforts are needed to foster such awareness and interests among students. We hope that more and more girls are to be inspired and could contribute to STEM.

The 2020 Nobel Prize in Chemistry and 2016 L'Oréal-UNESCO For Women in Science Laureate Emmanuelle Charpentier said; "My wish is that this will provide a positive message to the young girls who would like to follow the path of science, and to show them that women in science can also have an impact through the research that they are performing" (BBC, 2020). The researchers also hope to have this corrugated view.

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References

- Abu Bakar A Hamid, Hutchinson, C., Khoo, K., Joseph, K., Lim, C., & Mohd Fauzi Ya'acob. (2009). *Glimpses of the Past: The University at Pantai Valley*. Kuala Lumpur: University Malaya Press
- Ahmad Zufrie Abd Rahman, Chong, S., Zeitley Karmilla Kaman, & Leon, C. (2020). Use of the Resilience Concept in the CEFR-Aligned English for Science and Technology (EST) Classes in Malaysian Secondary Schools through Victorian Literature. *IEEE TALE 2020: Embarking On A New Era Of Learning With Transformative Technologies*. Japan
- Alikhani, M. (2018). *Technical Poetry: A Case Study of Teaching Technical Writing to Engineering Students through Poetry and Metaphor*. New York: Columbia University Dissertation
- Ang, S. (2000). *The Widening World of Children's Literature*. London: Macmillan
- BBC. (2020, October 7). Two women share chemistry Nobel in historic win for 'genetic scissors'. *BBC*.
- Butler, J. (2006). *Gender Trouble: Feminism and the Subversion of Identity*. New York: Routledge.
- Carter, R., & Long, M. (1991). *Teaching literature*. Oxford: Oxford University Press
- Chong, S., Ng, Y., Loh, K., & Ahmad Zufrie Abd Rahman. (, 2019). Assessing environmental education through KBSM social sciences subjects: Three case studies. *Test Engineering and Management*, 81(11-12), 3828-3832
- Collins, K. (2012). Spirited Singles: Re-reading Femininity in Anne of Green Gables. *The 2012 Pan-SIG Conference Proceedings*. Tokyo
- Curriculum Development Division, Ministry of Education, Malaysia. (2016). *Sharing Malaysian Experience in Participation of Girls in STEM Education*. Geneva: UNESCO International Bureau of Education (IBE)

- Davidson, J. (2004). Professional Education and Female Accomplishments: Gender and Education in Maria Edgeworth's Patronage. In L. Troost (Ed.), *Eighteenth-Century Women: Studies in Their Lives, Work, and Culture* (Vol. VI, pp. 259-85). New York: AMS Press
- Gabriel, S. (1994, November 16). Compelling Story of Female Awakening: Indrani Aikath-Gyaltsen's 'Daughters of the House'. *The New Straits Times/Literary*
- Gabriel, S. (2020). *Making Heritage in Malaysia: Sites, Histories, Identities*. London & New York: Palgrave Macmillan
- Gabriel, S., & Wilson, B. (2020). *Asian Children's Literature and Film in a Global Age: Local, National and Transnational Trajectories*. London & New York: Palgrave Macmillan
- Irigaray, L. (1992). *The Irigaray Reader*. London: Wiley-Blackwell
- Kristeva, J. (1991). *The Kristeva Reader*. London: Wiley-Blackwell
- Leon, C. (2009). *Movement and Belonging: Lines, Places and Spaces of Travel*. New York: Peter Lang
- Lim, C., & Yoshihara, Y. (2007). *English Studies in Asia*. Kuala Lumpur: Silverfish Books
- Lowne, C. (2020, March 12). *Encyclopædia Britannica*. Retrieved December 14, 2020, from <https://www.britannica.com/topic/Anne-of-Green-Gables>
- McCoy, S. (2018, October 19). Why 'Anne of Green Gables' and 'Little Women' Still Inspire Us Today. *Electric Lit*
- Millan, H. (1996). Poetry in Engineering Education. *Journal of Engineering Education*, 85(2), 157-161
- Ministry of Education. (2012). *Report on the Strategies to achieve 60% Science and Technical Stream: 40 % Arts stream Policy*. Putrajaya: Ministry of Education
- Montgomery, L. (1983 [1915]). *Anne of the Island*. London: Starfire
- Montgomery, L. (1984 [1917]). *Anne of Windy Poplars*. London: Starfire
- Montgomery, L. (1984 [1939]). *Anne of Inglesid*. London: Starfire
- Montgomery, L. (1992 [1936]). *Anne's House of Dreams*. London: Starfire
- Montgomery, L. (2011 [1909]). *Anne of Avonlea*. Oxford: Oxford University Press
- Montgomery, L. (2020 [1908]). *Anne of Green Gables*. Oxford: Oxford University Press
- Rajasekaran, W., Karthikeyan, J., Chong, S., & Karunakaran, T. (2019). The outlook of university students and their profession strategy. *Journal of Advanced Research in Dynamical and Control Systems*, 11(1), 848–854
- Rosenblatt, L. (1995). *Literature as Exploration*. New York: MLA
- Sharifah Aishah Osman, & Tutu Dutta. (2019). *The Principal Girl: Feminist Tales from Asia*. Kuala Lumpur, Malaysia: Gerakbudaya Enterprise,
- Simons, J. (2009). Gender roles in children's fiction. In *The Cambridge Companion to Children's Literature*. Cambridge: Cambridge University Press
- Small, H. (2013). *The Value of the Humanities*. Oxford: Oxford University Press
- Smith, J., Flowers, P., & Larkin, M. (2009). *Interpretative Phenomenological Analysis: Theory, Method and Research*. London: SAGE

Somer, J. (2020). *Louise Rosenblatt: The Essence of Civility*. London: Covenant Books

Tan, K. (2011). *Mission schools of Malaya*. Selangor: Taylor's Press

Tan, K. (2015). *Mission Pioneers of Malaya: Origins, Architecture and Legacy of Our Pioneering Schools*. Selangor: Taylor's Press