

## RADIATING LIFE NARRATIVES INTO ENGINEERING EDUCATION

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### Abstract

This paper is yet another entry into the exciting field of multidisciplinary studies as it seeks to break walls that have traditionally separated scholars in specialized fields of interest. This study shines literary light onto the area of engineering education as it examines the inclusion of the literary genre of autobiography into the halls of engineering faculties allowing it to serve as a possible generative tool to attract and retain talented men and women in the field of engineering. It offers engineering education a reformulated approach to the reading of life narratives as a means to draw engineering enthusiasts and practitioners into a deeper understanding and a sense of appreciation for their chosen field from literary and psychological perspectives. Psychologists in the area of personality psychology have observed that life stories written by highly generative adults reveal a strong concern for and commitment towards improving and maintaining the quality of life for future generations. This study of life stories of engineers heads a series of studies identifying and examining autobiographies or life narratives written by professional men and women from multiethnic backgrounds and how their stories can potentially generate positive outcomes that may include inspiring and encouraging a sense of dedicated commitment and purpose in their chosen fields.

**Keywords:** autobiographies, engineering education, generativity, life narratives, positive outcomes.

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### 1. Introduction

The National President of Engineers Australia, Julie Hammer, records in *Women in Engineering* (2008) that “[e]ngineering is an exciting profession that drives change and improvement in our world” (1). She goes further to state that,

The coming decades will be a great time to be an engineer. The world of the 21st Century is taking on a different landscape, both figuratively and literally. Workplaces are global and cultural diversity is the norm. The problems that engineers must solve are critical to the survival of future generations and the planet. The best possible solutions will be found if men and women combine their considerable talents together to lead and work in engineering teams. (1)

The expectation that engineers should possess leadership qualities and be able to build successful teams in a global environment that is attributed as being multicultural and multi-ethnic, can be overwhelming to up-and-coming engineers pursuing their ambition. The impression that the possession of merely strong technical know-how is somewhat insufficient in the 21st Century may be a discouraging factor for young engineers lacking in experience and wisdom to successfully and effectively manage their way through competitive and diverse work environments. Getting a head start in what may be in store from them in the “real world of engineering” by examining the life stories of engineers from diverse backgrounds who have had a life time of experiences is something that can possibly lead to positive outcomes. This paper is proposing engineering education programmes to take on an inter-disciplinary option of including the study of literature in the form of the

autobiographical genre, in particular, written by multi-ethnic and multicultural engineers from both men and women as a way to attract and retain people in the engineering field.

Young or aspiring engineers need role-models to emulate and learn from and some professionals experienced in their specific fields have knowledge and wisdom from lessons learnt that they would like to share for the betterment of future generations. On one hand there are groups who yearn to learn and on the other hand, there are those who wish to share their life long experiences for the benefit of others. The inclusion of the study of autobiographies written by engineers into engineering education programmes as a teaching tool can enhance the effort to retain and attract talented men and women in the field.

## 2. Discussions

### Autobiography

Autobiography has been famously defined by Phillippe Lejeune as a “ [r]etrospective prose narrative written by a real person concerning his own existence, where the focus is his individual life, in particular the story of his personality” (*Women’s Autobiography and the Male Tradition* 198). One important condition that Lejeune identifies is that “the author, the narrator and the protagonist must be identical” (199). Scholars of autobiography, like Sidonie Smith and Julia Watson, have recognised that the term *autobiography* is open to alternative modes of address including life narrative and life writing (2001, *Reading Autobiography*, p. 197). They anticipate that interest in the study of life narratives will become increasingly comparative and multicultural (84) which is what this study hopes to promote.

### The Psycho-Literary Connection

Interesting and exciting developments in the area of personality psychology involving the concept of generativity pioneered by Erik Erikson, have strongly suggested that people fashion their life stories in relation to culture and society, from as early as adolescence, in order to give a sense of meaning to life they have led. With increase in age, along with the accumulation of new experiences affecting personality development, a person’s narrative identity changes over time, and eventually forms a life story that “is really shared cultural knowledge about the life course” (*The Redemptive Self*, p. 246). This psychological observation has further led to recent expansions of the notion of generativity into a multidimensional concept. A recent literary study was done to reformulate or rethink the approach to the reading of life narratives by applying the concept of generativity in analysing life narratives of multi-ethnic Malaysian women (Haslina, 2013). This approach expands the narrow notion that autobiographies are merely a chronological self-description of the events in a person’s life. Hence, autobiographies written by people in the field of engineering, for example, can be read not only for the description of achievements in the profession but also for the concerns engineering practitioners have for the well-being of future generations as derived from their experience and wisdom. This paper seeks to suggest how the inclusion of life narratives as part of engineering education programmes can function as a means to attract, if not, maintain the level of attraction and hence, retain human talent in the field of engineering.

### Reading the Lives of Highly Generative Engineers

Since the introduction of the concept of generativity over 60 years ago by Erikson, it has been revitalised most prominently by psychologists Dan McAdams and John Kotre and has become multifaceted in its application to the study of human development. This study sees the relevance of McAdams’ observations of recurring narrative themes found in life stories of

highly generative adults and Kotre's discussion on the significance of generative outcomes. Both McAdams and Kotre agreed that human personality factors can possibly be captured in narratives, as they record how an individual makes sense of their experience. This is reflected in the words of civil engineer Joseph Buley in his autobiography, *In the Shadows* (2013) when he said, "[u]nfortunately, the only time engineers are in the light are when bridges break, dams fail, sewage leaks, or something goes wrong. I hope the next generation understands that civil engineers are essential to the modern world" as he also emphasizes the importance of character, capability and capacity as traits that help young engineers build successful careers (Huntington Beach, California (PRWEB) June 17, 2013).

Although the finer details of an individual's life story necessarily differ from that of other individuals, McAdams claims that there are "common patterns" that can be found in most autobiographies (2006, *The Redemptive Self*, p. 91). Two decades of research in the field has led McAdams and his peers to observe that stories told by highly generative middle aged American adults, for instance, are likely to contain a theme of the power of human redemption (McAdams, 2006, p. 82). This theme of redemption is defined by McAdams as "the deliverance from suffering to an enhanced position in life" or the experience of a "second chance" in life (81). These stories of redemption may also incorporate themes of childhood advantages, early awareness of the suffering of others, moral clarity and steadfastness, the conflict between power and love, as well as future growth and fulfilment (81). Although the findings made by McAdams and his peers were not mainly from studies done on published autobiographies, these common patterns he and his colleagues have identified can be applied in the analysis of the writer and his life story, as in an autobiography, the writer, the narrator and the protagonist are one and the same.

### **Engineering Education's Literary Connection - Life Narratives of Men and Women Engineers**

Engineering marvels that have been invented or developed all around the developed or developing world exist within a broad range of geopolitical, economic, technological, social and cultural transformations within a country or region. The study of autobiographies written by engineers will not only provide readers with prevailing understandings of the role played by engineers in contributing to a country's technological advancement and history, but also the wisdom that the writers wish to impart within the chosen themes of their published life stories or autobiographies. *Slide Rule: Autobiography of an Engineer* (1954) by Nevil Shute, *Surviving the Academic Arena: My Complex Journey to the Apex* (2011) by F.J.Gichaga, *As I Remember: An Autobiography* (1998) by Lilian Moller Gilbreth, *Memoirs of an Engineer* (2012) by George Wilson and *In the Shadows* by Buley (2013) are such examples.

Among the memoirs written by engineers, the most notable among engineering academics in the Western world would be Nevil Shute's *Slide Rule* (1954). Nevil Shute Norway, according to Dr David P. Stern, was for twenty years an aeronautical engineer and builder and designer of airplanes and airships. He was also a British novelist whose novels became famous after World War II. As John C. Anderson remarked, "Shute's books contain many nuggets of engineering detail in them; the appeal to me is that they are all accurate and so evidently drawn from his own knowledge and experience." *Slide Rule* has been previously proposed as being relevant to engineering education in its role in highlighting the need to be aware that the practice of engineering entails the inclusion of a range of knowledge and skills. However, this paper proposes a reading approach not only for Shute's autobiography, but also those written by other engineers from diverse socioeconomic backgrounds and cultures. This study suggests that the presence of global work environments necessitates the need for the study of

life narratives of engineers written by both men and women from multiethnic origins within varied historical and socio-economic settings.

Engineers, both male and female, have in the past and present, written and published their autobiographies. Their gender differences and diverse cultural backgrounds require them to resort to unique approaches to solving problems. Julie Hammer an electronics engineer and the National President of Engineers Australia in 2008 highlighted the need to attract people to engineering as the profession is underrepresented in Australia. She says that “[e]ngineers create the very fabric of society and govern the way in which we experience life” (*Women in Engineering – Stories of Inspiration*, p. 1) and also she believes that the different landscape taking shape in the world of the 21<sup>st</sup> Century has a need for women’s creativity and expertise as they “hold unique insights on the issues that are important in the world and in turn provide unique approaches to solving problems” (1). Literary scholars have highlighted that women’s autobiographies contain certain traits that make them distinguishable from men’s autobiographies. Although this paper is not directed at making comparisons between the two, the proposed inclusion of the study of autobiographies in engineering education will educate readers with the way women think, as in narrating their experiences, they also reveal what drives them towards the decisions they make in life. As the best possible solutions can be derived when men and women combine their considerable talents together to lead and work in engineering teams, it is also helpful to know that men and women take different paths of moral development according to psychologist Carol Gilligan (1982, pp. 42-3). Lillian Moller Gilbreth who was born in 1878 in Oakland, California, was a mother of twelve children and who was also the first female professor at Purdue University’s engineering school. She continued to teach at the university until she retired in 1948 at the age of 70. Labelled as “The World’s Greatest Woman Engineer” in 1952 by J.W. McKenny, Gilbreth is recognised for “her impact on management, her innovations in industrial design, her methodological contributions to time and motion studies, her humanization of management principles, and her role in integrating the principles of science and management” (Kelly & Kelly, 1990, p. 123). Lillian and her husband, Frank, built a successful partnership as they shared the same passion towards the application scientific management and they also wrote several books together. Lillian began to write her autobiography (which was posthumously published) after her husband died in 1924. Personality researchers have observed linkages between life narratives and characteristic adaptations found in the recurrent narrative themes in life stories of highly generative adults. Social motives concerning power and love (intimacy), for instance, were reflected in the narrative themes of people with strong power motives and those highly motivated by love.

People with strong power motives tend to construct personal narratives and life stories that feature such agentic life themes as self-mastery, status and victory, achievement and responsibility, and empowerment; those high in intimacy motivation tend to construct more communal life narratives, emphasizing love and friendship, dialogue, caring for others, and belongingness (McAdams, 2008, “Personal Narratives and the Life Story”, p. 249). McAdams also explained that life stories of highly generative adults show notions of the manifestation of destiny that are reflected in the theme of early advantage. Some advantages can be internal like for example, having a unique talent or skill and some advantages can be external like for instance, having a warm caring family or supportive teacher. Whether these advantages they highlight are internal or external, these life narrators identify themselves as the chosen people. McAdams states that “whether the protagonist in the story actively ‘earns’ the advantage or is the beneficiary of events beyond his or her control, the early advantage exerts a long-term positive impact (2006, *The Redemptive Self*, p. 117). This theme of early advantage is evident in the *Memoirs of an Engineer: The George Wilson Story* (2012).



George Wilson was born on April 25, 1909 in Angus Ridge, Alberta. Wilson retired in 1972 after a lengthy career as a wiper, fireman and later an engineer for the Canadian Pacific Railway. In his memoirs, Wilson wrote:

On a Sunday in the summer of 1915, I was with my Father and Uncle Ed in the Angus Ridge corner visiting when a man on a motorcycle drove up and stopped. That was the first time I had ever seen a motorcycle that close. I remember that it had a flat belt for the drive and a one-cylinder engine, I think that they said the rider's name was Cyclone Murray or that is what his friends called him, but for me it was an insight into a whole new world of technology and machinery. (*Memoirs of an Engineer* 13)

### The Global Workplace

When a generative adult considers the needs of the next generation by writing and publishing an autobiography, for instance, generative outcomes usually follow, accompanied by an intense desire to leave the world with a legacy of the self (Kotre, 1984, p. 10). As workplaces become more global and culturally diverse, the collaboration between male and female experts in various fields and from varied multiethnic backgrounds become increasingly crucial in many places. As such, engineers need to generate a greater understanding of people in general as they face critical problem solving decisions that determine the survival of future generations and the planet. Any opportunity to enhance greater understanding between cultures or gender should be promoted and an option to consider is in the study of life narratives as is proposed in this paper. Tales of personal failures and disappointments are transformed into positives when autobiographers place their personal experiences in a broader context, enabling them to find a vocabulary for their struggles; and when they make these life stories public, they seek a community with whom they can share their tales (Manheimer, 1995, p. 17). These shared personal failures and successes resonate in memoirs like the one written by civil engineer, Joseph Buley who was born in 1939. Buley describes in his autobiography of belonging to the generation which had five young men in 1963, make up "the third group of NASA astronauts and support specialist" (3). Buley, who graduated from the University of Vermont with a degree in civil engineering in June 1961, went to pursue a professional career in civil engineering with two government entities and twelve construction companies. With years of experience behind him, he shares with us in his autobiography, among other things, that engineers "build and maintain the infrastructure that provides society with necessities that make millions of lives safe and efficient" (2013). In studying life stories like Buley's, we get an insight into problem solving decisions during a time and place that may differ from ours, however, these episodes in Buley's life may still teach, guide and even inspire us today, regardless of which ever country we may originate from.

### 3. Conceptual Framework

#### Life Stories – Instinctual Creations of Generativity

In his theory of human development, Erikson believed that "each person moves through life, from birth to death, in a complex and changing social context" (*The Life Cycle Completed*, p. 50). These changes occur in a series of eight interrelated stages over an individual's entire life cycle. A mature adult at middle age (35–65 years) would be at the seventh stage of Erikson's theory—which embodies the construct of generativity versus stagnation—and has been considered one of the most important life stages (Justin Lim 40). This is the stage in adulthood in which the adult will make an instinctual shift towards generativity (cf. Erikson, *Childhood and Society*). When an adult faces difficulty in rising to the challenges inherent in generative activities, he or she will experience what Erikson terms *stagnation* or *self-preoccupation* (McAdams, 2006, *The Redemptive Self*, p. 83). The appreciation of life's achievements and at the same time, the ability to accept that all one's dreams and goals may

not have been attained, marks the successful negotiation of the generativity versus stagnation stage of adult development. The life stories of generative individuals can themselves be forms of *generative legacies*, for the stories are psychosocially created and maintained and offered to others as a lesson or gift (cf. Maruna “Going Straight”; McAdams *The Stories We Live By*). A *generative outcome*, therefore, involves taking into consideration the needs of the next generation with an increased focus on leaving the world with a legacy of the self (Kotre, “Generative Outcomes”, p. 35), given that generativity not only concerns the psychological welfare of one’s children, but also for humanity in general (Justin Lim 40).

This paper suggests that the study of life narratives particularly written by engineers be included as part of engineering education to attract and retain engineering enthusiasts, as the reading approach that is suggested not only will connect or reconnect readers to the engineering lives of people from different backgrounds and origin but also provide them with the opportunity to inherit a legacy that is passed on with the intention to generate further positive outcomes.

### Conclusion

The proposal of including the study of autobiographies by multi-ethnic engineers, both men and women, into engineering education programmes goes beyond the purpose of improving language skills as although the emphasis on technical competence is of paramount importance in engineering education, the softer skills that involve being a good listener, teamwork and interaction in the workplace are also important in educating people to become more well-rounded as they practice the qualities of care and concern in carrying out their profession. Although this paper does not provide a list of autobiographies written by engineers that can be studied, the psycho-literary reading approach discussed can be applied to the reading of a range of life narratives selected by engineering course instructors as part of engineering education as these life narratives *radiate* ways to attract and retain men and women from diverse cultural backgrounds into and within the field of engineering.

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