MITIGATING THE MATILDA EFFECT ON BEATRIZ FAINHOLC: TRIPLE E MODEL FRAMEWORK

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ABSTRACT

This paper examines Beatriz Fainholc's research and the relevance of the Triple E Model Framework in lesson design and technology integration to enhance learning outcomes. It acknowledges that the accurate measure of success in education lies in enabling every child to fulfill their potential, emphasizing the need for an inclusive learning environment where all students can thrive intellectually and emotionally. Central to this endeavour is addressing the Matilda Effect and other biases that may hinder the recognition and advancement of marginalized individuals in education and beyond. Cultivating students' curiosity and resilience, regardless of their backgrounds, is essential for creating a conducive learning atmosphere, and providing necessary support systems and resources. Thus, educational institutions and policymakers need to prioritize the accommodation of diverse learning needs, aid students facing challenges, and foster a sense of belonging and inclusion within the school community. By integrating Fainholc's research and the Triple E framework into lesson planning and educational policies, educators can create dynamic and inclusive learning environments conducive to facilitating the holistic development of every student, while actively combating biases, such as the Matilda Effect.

Keywords: Beatriz Fainholc, Information technology (IT), Matilda Effect, STEM, Tripe E Framework

INTRODUCTION

This paper examines Beatriz Fainholc's research, exploring how the Triple E Framework (Kolb, 2011) intersects with the Matilda Effect (Rossiter, 1993), mainly through the design of lessons that integrate technology to enhance learning outcomes. Scholars such as Beatriz Fainholc have shed light on the *Matilda Effect* (in brief, the systematic underrepresentation of women in various disciplines), emphasizing the significance of acknowledging and appreciating the contributions made by women and marginalized individuals in higher education and other disciplines. According to Adam Grant, an accurate measure of success in an educational system is when every child, regardless of background or resources, can reach their full potential, necessitating the creation of an environment in which all students can achieve intellectually, and emotionally thrive (Grant, 2023).

Fostering students' curiosity and resilience is paramount for establishing an optimal learning environment supported by robust systems, resources, and equitable educational opportunities. Hence, organizations and nations must acknowledge and address diverse learning needs, assist students encountering challenges, and cultivate an atmosphere of inclusivity and belonging within educational environments. During two interviews, conducted nearly a quarter of a century apart, Beatriz Fainholc consistently emphasized

the critical importance of online education in mitigating student isolation and reaching students from various socioeconomic backgrounds (Bainbridge & Wark, 2023; Gayol, 2000). According to Fainholc, teachers and instructional designers must profoundly comprehend distance learning principles as they design and guide students through online learning experiences. To succeed in education, Fainholc believes that it is essential to confront systemic inequities and obstacles hindering some children from realizing their full potential. She advocates for the implementation of policy reforms, effective allocation of resources, provision of adequate teacher training, and community involvement to ensure equitable student achievement (Bainbridge & Wark, 2023; Gayol, 2000). A robust educational system nurtures children's sense of agency, resilience, and curiosity, laying the groundwork for them to become engaged citizens and lifelong learners.

Fainholc also advocates for a learner-centred approach to facilitate students' knowledge development, empowering learners to negotiate meaning as they actively deepen their understanding. In remote facilitation, it becomes imperative to challenge the conventional notion of contact solely as an exchange of information (Gayol, 2000). Additionally, Fainholc suggests that instructional designers shift their focus toward crafting engaging and pertinent methods to aid students in grasping intricate concepts and procedures (Gayol, 2000). To advance the integration of technology in education, a fusion of Fainholc's learner-centred approach and the Triple E Framework (Kolb, 2011)—emphasizing engagement, enhancement, and extension—holds promise in establishing an equitable post-pandemic learning environment for all students.

The Triple E Framework, developed by Liz Kolb in 2011 for K-12 settings, has also been adapted for adult education to help teachers achieve learning goals using technology. Unlike other integration frameworks, it places a higher importance on student engagement and the deliberate use of technology to enhance and broaden learning. Enhancement occurs when technology enables learning by aligning with the subject, rather than being used simply because it is available. This leads to an extension of technology by students outside of the classroom, linking their educational endeavours with their everyday experiences (Gaer & Reyes, 2022). This framework enables instructors to make informed technology decisions while using a learner-centred approach to create lessons that promote authentic, active learning, and social and creative skill development, while adhering to educational theories of constructivism and cognitivism.

BIOGRAPHICAL BACKGROUND: BEATRIZ FAINHOLC

Beatriz Fainholc, Director of Argentina's Centre for the Design, Production, and Evaluation of Multimedia Resources for Learning, has been teaching educational technology at the National University of La Plata since 1987. Throughout her career, she has conducted substantial research on educational technologies and distance education. In 1986, she advised Argentina's Ministry of Education on the country's first national distance education plan for rural technical and agricultural training. Fainholc has also helped Uruguayan provincial governments and educational organizations. Two of the five books that Fainholc wrote before 2000 include, *Education a Distancia* (1980), Argentina's first distance education publication, and *La Tecnologia Propia y Apropiada* (1990), a widely used teacher training textbook in Argentina and other Latin American nations. She also authored *La Televisión y Los Niños en la Argentina* (1984), *Education a Distancia en Canada* (1994), and *La Interactividad en la Education a Distancia* (1999; Bainbridge & Wark, 2023; Gayol, 2000).

Beatriz Fainholc's interview (Gayol, 2000) emphasizes the potential for distance learning educators to promote open education using information technology (IT) resources, aligning with the three goals of the Triple E framework (Kolb, 2011): engagement, enhancement, and extension. Beatriz Fainholc highlights the capacity of online teachers to level the

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playing field in the classroom by embracing IT innovation. However, she thinks institutions should not place higher priority on technological prowess over content quality and moral principles. Continual engagement with content specialists should encompass these subjects, as they require more than technical skills (Gayol, 2000). She believes that content quality and ethical norms should be of higher priority than the development of learners' technical skills. Hence, she promotes ongoing dialogues with content experts to attain a well-rounded strategy for integrating technology.

Beatriz Fainholc highlights the fundamental challenge of effectively integrating technology into educational programs. She believes that educators across the globe should create and enhance educational techniques for incorporating IT, since using technology to improve meaningful learning might be beneficial in overcoming challenges, such as resistance toward technology (Gayol, 2000). Fainholc's observations emphasize the significance of aligning endeavours to integrate technology with learning objectives and offering sufficient assistance to instructors, which are vital components of the Triple E framework (Kolb, 2011). By incorporating these concepts, instructors can effectively leverage technology to enhance learning experiences for students in distance learning programs. Finally, Fainholc emphasizes that schools must ensure: (1)that teachers receive comprehensive technical and educational training to ensure IT proficiency and seamless integration of IT into their teaching, as well as (2) the evaluation of the quality of educational resources (Gayol, 2000).

The following review of some of Fainholc's most current work confirms her tireless promotion of the value of distance education and the technologies that enable it.

HYBRID LEARNING, ARTIFICIAL INTELLIGENCE (AI), AND POST-PANDEMIC EDUCATION

The following section highlights one book chapter and two articles that Fainholc recently published. The 2021 book chapter is on hybrid learning and education. Fainholc's 2021 article discusses the relationship between artificial intelligence (AI) and education, and her 2024 article considers the future of post-pandemic education.

Book Chapter: Hybrid Learning and Education

The COVID-19 pandemic has increased the demand on women's caregiving responsibilities. In response, several higher education institutions have introduced virtual and hybrid programs, enabling students to study remotely. Many of these courses are available asynchronously, giving students more flexibility to balance school, job, and family responsibilities. Because of their adaptability, online courses provide cost savings for institutions and students. These programs are especially appealing to women who are primary caregivers, because such programs are less expensive and allow for more flexibility in scheduling and participation (Cukier et al., 2023).

According to Fainholc's (2021a) book chapter, *Una Educación Continua Híbrida Adaptativa Para Los Tiempos de Pospandemia y Más Allá*, hybrid education provides a modern approach that streamlines the modification and advancement of pedagogical concepts and communication processes. Combining virtual communication and traditional in-person teaching methodologies addresses important issues, such as the pandemic and resource inequality. Hybrid education places a high priority on efficient use of time and completing learning goals to engage students. The effectiveness of hybrid education depends not only on the technology itself, but also on the idea and execution of technology to accomplish particular educational goals. This undertaking requires the proficiency of instructional designers and capable instructors to coordinate content, evaluate learning results, and efficiently manage institutional administration (Fainholc, 2021a).

In addition, Fainholc (2021a) points out that the intricate and uncertain nature of adaptation requires substantial effort and guidance to help learners uncover meaning and navigate changing experiences; thus, there is a need to foster and cultivate critical thinking skills to support the growth of individuals and society. Hybrid learning should strive to balance in-person and online settings, effectively integrating and coordinating various learning experiences. This type of learning process encompasses flexible and adjustable techniques that facilitate developing, implementing, and evaluating educational encounters in synchronous and virtual learning environments (Fainholc, 2021a).

Finally, Fainholc (2021a) believes that formal education should actively recognize and address the intricate and unpredictable elements of the 21st century, while also assuming a prominent role in addressing the dynamics of society. Her book chapter argues that it is incorrect to view education as a passive element; it should be an active force shaping sociocultural progress. Consequently, higher education institutions must address the cost of pursuing education after the pandemic. According to Wall (2021), a decline in employment prospects may reduce young women's capacity to pay for their education and the total amount of student debt they are willing to accumulate. Based on a crowdsourcing survey conducted in the spring of 2020, 47% of college and university students reported experiencing substantial anxiety regarding the potential increase in their student debt due to the COVID-19 pandemic (Wall, 2021). Offering a low-cost hybrid postsecondary option demonstrates that education can promote positive change and social advancement, proving that education is not a passive agent, but a catalyst for social change.

Article 1: The Future of Post-Pandemic Education

To effectively address the challenges and leverage the opportunities of the digital age, distance learning programs must prioritize engagement, enhancement, and extension through the seamless integration of technology. Fainholc's (2021b) article, *Imaginar la Educación Post-pandemia es Imaginar un Futuro Desconocido*, proposes that this can be achieved by:

1. Creating a post-pandemic hybrid education system that employs technology to profoundly alter our lives through internal and external instruments.
2. Depending on the formative, social, and political-economic implications of higher education that go beyond institutions. Academic, institutional, and student ethics support critical engagement with biased interpretations, encouraging conceptual, social, and educational change.
3. Deconstructing concepts, processes, and words in formal, non-formal, and informal education that alter philosophy, epistemology, and language. Science, society, culture, technology, and education are inextricably linked, encouraging logical conversation and preparing people for digital and post-pandemic futures, and
4. Utilizing software analysis, artificial intelligence (AI), and big data in hybrid continuing education programs, which entails acknowledging the ability of technology to transform designs, language, and communication, and ultimately boosting education (Fainholc, 2021b, p. 19).

Working remotely, online learning, data analysis, AI, and cloud computing are some of the ways Fainholc highlights the significant influence of the digital era on society around the world. As Fainholc (2021b) points out, the pandemic has had far-reaching effects on political and social arenas worldwide, and technological advancements due to the pandemic's worldwide health catastrophe since 2020 have accelerated historical processes. According to a report from Statistics Canada, postsecondary enrolment among young

women aged 15 to 29 increased during the COVID-19 pandemic, from 29% in 2019/2020 to 32% in 2020/2021 (Government of Canada, 2021). Yet, although young Canadian-born women's postsecondary attendance rose, that of young immigrant women did not change (Government of Canada, 2021). While the pandemic presented opportunities for certain women in Canada, it also exacerbated the existing gender equality gap within a segmented group of women in the country.

With the acceleration of technical changes during the pandemic and the need for quick adaptations, the Triple E framework (Kolb, 2011) incorporates the importance of active participation, efficient time use, and well-defined educational objectives in distance learning programs. It implies an adaptable and dynamic approach to education that can effectively respond to the ever-changing digital environment (Fainholc, 2021b). Moreover, the declaration emphasizes improving educational designs by including other disciplines and philosophical perspectives, such as art, humanities, and post-humanist philosophy. This comprehensive approach promotes self-reflection and cooperative participation, highlighting the importance of genuine learning experiences and cultivating interpersonal skills (Fainholc, 2021b). Therefore, education should engage all women by integrating representation through relatable information.

Fainholc (2021b) asserts that as with the growing significance of hybrid learning methods, in terms of expansion and the rapid growth of AI, educational programs need to effectively convey knowledge and develop socio-cognitive abilities to navigate an uncertain future. Such changes highlight the evolving nature of education, which must adapt to incorporate digital technologies and prepare individuals for the complexities of contemporary society. Unfortunately, as elaborated upon below, there are few female role models for girls who choose to pursue careers in information and communication technology (ICT) and STEM (Daraz et al., 2022). Furthermore, high school students, whose parents do not work in the industry, either do not know about IT career paths or have false impressions of the field (Cukier et al., 2023).

Article 2: Artificial Intelligence (AI) and Education

In her 2024 article, *Colaboraciones Teórico-Prácticas De Investigaciones Sobre la Relación de Inteligencia Artificial (IA) y Educación*, Fainholc emphasizes the importance of using new technology to engage, enhance, and extend learning in the changing educational landscape. Fainholc states that:

1. Hybrid educational programs must be contextualized, reflective, and integrated into institutional, curricular, and ongoing teaching frameworks, which balance present and future requirements.
2. Higher education institutions should train teachers to choose wisely and blend physical and virtual techniques. While focusing on professional development, the goal is to map new knowledge categories in a changing educational setting.
3. Educators should teach the abductive method, using conjectures to resolve problems and find superior answers. Hypotheses are formed from processed data and verified to explain plausible causes, and
4. Students must develop critical reading skills to examine digital information, applications, and forms to reveal interpretations and refute preconceptions. This method challenges and disproves common beliefs (Fainholc, 2024, p. 19).

In 2019, Statistics Canada released a gender-focused study examining career pathways for STEM graduates (Daraz et al., 2022). This report stated that women accounted for only one-third, or 35.8%, of all STEM graduates in Canada in 2017 (Statistics Canada, 2019, as cited in Daraz et al., 2022). Moreover, only one out of five women pursued careers in STEM fields after completing their postsecondary education. The study identified several factors

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contributing to the departure of many women from STEM occupations post-graduation, including family responsibilities, marital status, cultural influences, field of study, lack of confidence, and limited female role models (Daraz et al., 2022).

To mitigate the trend of women leaving STEM fields, and to enhance engagement and motivation, particularly among young women facing diversity challenges in Canada, educators should prioritize interactive and collaborative learning activities, foster self-directed inquiry, and employ technology for communication and collaboration (Fainholc, 2024). These strategies enable educators to establish inclusive and dynamic learning environments that empower students intellectually and emotionally, facilitating their pursuit of educational goals. While various models exist for integrating technology into teaching, Mujtaba Asad et al. (2022) highlight that only specific models, such as the Triple E Framework (Kolb, 2011), directly leverage technology to achieve learning objectives.

The objective of the increasing need for more female graduates specifically in AI programs is to enhance the representation of women in AI leadership positions throughout Canada (Daraz et al., 2022). However, addressing this issue alone may not fully address the gender disparity, as women still encounter significant obstacles in environments that are male-dominated. Although there has been a noticeable increase in women holding influential AI positions in different sectors, such as universities, it is essential to recognize that women may still face discrimination and obstacles in these environments (Daraz et al., 2022). These factors could discourage women from pursuing or maintaining leadership roles in AI. Additional clarification and support systems are necessary to ensure that the rise in female graduates in AI leads to consistent representation in leadership positions.

In her research, Fainholc (2024) examines the substantial impact of technological advancements on educational strategies, namely in pedagogical approaches and educational encounters in traditional, online, and blended learning settings. She emphasizes the notable transition towards informal learning, where individuals, particularly children and young adults, progressively interact regularly with diverse software applications. This trend has the potential to weaken the effectiveness of the traditional educational system (Fainholc, 2024). When it comes to expanding the use of AI in education, it is essential to find a balance between using AI for personalized learning, and maintaining the crucial aspects of human interaction and critical thinking. This highlights the significance of providing authentic learning experiences and developing soft skills, even in educational environments that rely on technology (Fainholc, 2024).

CONCLUSION

In summation, Fainholc emphasizes that increasing active interaction is crucial to the success of distance education efforts. These learner-centred approaches promote involvement, engagement, and critical thinking, and empower students to take control of their educational journey (Gayol, 2000). Rethinking our approach to education, especially in higher education, becomes imperative in this era of digital transformation. Education must evolve to impart knowledge, and to recognize and overcome biases, including those perpetuating the Matilda Effect (Rossiter, 1993), igniting curiosity and inspiring lifelong learning. Education should be a beacon of opportunity, leveraging individuals' doubts and curiosity to foster growth and development. However, despite technological advancements, disparities persist, as evidenced by the lower employment rates of young women compared to men in 2020 (Government of Canada, 2021). This discrepancy underscores the urgent need for inclusive and equitable educational practices that address and mitigate the Matilda Effect and other forms of bias.

As Fainholc emphasizes, embracing socio-cognitive, artificial, and software tools is crucial to navigating the complexities of the digital age. It requires a multifaceted approach that

combines introspection with forward-thinking, acknowledging our history and our future possibilities. By adopting an open and democratic mindset, we can harness the potential of hybrid and continuous learning modalities, recognizing them as pervasive factors that shape our educational landscape.

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