THE PRIMER AS PEDAGOGICAL AI AND THE FUTURE OF EDUCATIONAL TECHNOLOGY

Ms. G. D. HARI BHUVA SHREE
(Reg. No. 2421214022001)
Full-time PhD Research Scholar of English
Nazareth Margoschis College at Pillaiyanmanai,Nazareth
(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

Dr. C. GEETHA
Assistant Professor of English
Sri Kumara Gurupara Swamigal Arts College, Srivaikuntam, Thoothukudi

Abstract

In The Diamond Age (1995), Neal Stephenson introduces the Primer as a new education learner tool in which narratives not rote learning is taught. As opposed to the conventional schooling, the Primer will adjust the narrative on-the-fly to the experiences of the user, their emotional well-being, and developmental requirements. The Primer is a hypothetical project on digital pedagogy that is discussed in this paper with emphasis on the narrative nature of its approach as an example of the future directions in the context of educational technologies. The present paper will argue that adaptive storytelling is a Primer technique of structuring the cognitive development of Nell, her ethical choice, and creative problem solving. This work uses a speculative literary analysis in its analysis to review the role of Primer to act as a model learning technology of adaptive learning. The paper encompasses drawing upon Vygotskian theory and story arcs and analyzing their main parts and their pedagogical consequences using the approaches of narrative inquiry.
Keywords: Primer, Adaptive Storytelling, Digital Pedagogy

Neal Town Stephenson (1959 -) is an American writer whose works cover the areas of science fiction, historical fiction, cyberpunk and speculative fiction. The work of Stephenson affects the discussion of the digital pedagogy, posthumanism, and speculative futures keeping him at the center of the contemporary discourse of literature and technology. Recent research highlights the transformation of artificial intelligence in education, specifically in the adaptive learning systems that create a reaction to the cognitive and emotional conditions of learners. Williamson (2020) is opposed to the appearance of a new concept called datafied pedagogy under which algorithms adapt teaching in accordance with behavioral data. Likewise, Holmes et al. (2021) discuss the idea of AI tutors emulating empathy and responsiveness and recalls the capabilities of the Primer to scaffold the progression of Nell by narratively responding to their emotions. James Paul Gee (2007) holds that video games and interactive stories, by instilling knowledge into context, lead to in-depth learning. The instruction using tales described in the Primer can be compared to this method, as it employs the strategy of metaphor and allegory in order to educate abstract notions. Marketed fiction can ascribe to the research on narrative and storytelling as a cognitive and ethical hopping

ground that scholars like Hayles (1999) and Le Guin (2004) have long served as an example of fiction as pedagogical space where learners can practice deals on the real world.

As envisioned by Neal Stephenson in *The Diamond Age* (1995), nanotechnology has reshaped the world, and an interactive book, the Primer, built by self-assembling, stories, and brings its young reader through a sequence of moral dilemmas and practical challenges through the use of stories. This novel stands alone in the context of speculative fiction because it focuses more on high technology through cyberpunk, but it uses a neo-Victorian style to examine how a narrative device can transform society. In this book, the nanotech Primer is a book that is self-assembled which teaches a child how to think. The Primer is a pocket nano-scale device that comprises of self-assembling smart paper and programmable matter. Its external surface can be rolled out into storyboard illustrations as sensors are incorporated within the surface to monitor the user where he is gazing, gesture and surrounding and voice recognition. These gadgets track facial expression and voice cadence levels to use a harder or easier tone to maintain enthusiasm and eliminate frustration.

Nell, the main heroine starts life as a neglected thete (the bottom of the social hierarchy of the phyle based society of the novel) who is approximately four years old and who resides in a slum of Shanghai. She is changing into a self-centered leader through the process of her expedition with the Primer, as she becomes no longer an isolated and traumatized child. The Primer is referred to as the book that is capable of responding to its reader, altering its narrative, and educating her about everything she needed to know. The Primer is categorized according to Nell based on her developmental age, with AI being used to structure her learning.

"What's a raven?" Nell said. The illustration was a colorful painting of the island seen from up in the sky. The island rotated downward and out of the picture, becoming a view toward the ocean horizon. In the middle was a black dot. The picture zoomed in on the black dot, and it turned out to be a bird. Big letters appeared beneath. "R A V E N," the book said. "Raven. Now, say it with me." "Raven."

"Very good! Nell, you are a clever girl, and you have much talent with words. Can you spell raven?" Nell hesitated. She was still blushing from the praise. (Stephenson 95-6)

These are the narration of the Primer. This demonstrates that this device can be used to aid Nell in her learning of new words because she is an early stage learner. Nell can develop her level of cognition easily after interacting, on many occasions, with the Primer through the personalized adaptive learning. Nell later realizes that the characters of fiction and the storyline of the story are transforming in accordance with her own life. The Primer is a storytelling of the life that Nell has lived, with metaphor and allegory bringing abstract ideas to a heartfelt response. The Primer gradually gets used to the ZPD of Nell in such a way that it provides difficulty without overwhelming her and the stories can be reflective of her experiences and provide symbolic satisfaction. Primer nature to be adaptive as a storytelling tool is so close to the ZPD developed by Vygotsky, which acquires that a learner best develops

through being directed to perform at tasks marginally beyond what he or she is capable of at present. The Primer incessantly adjusts its toughness to the emotional and cognitive changes in Nell providing a scaffold in individual learning.

Here are the analyses of some of the tales and what was learnt in it or its skill that was accomplished by Nell. Nell knows how to solve problems, endure, and think morally through the Four Keys Quest. Her experience of uncommon challenges retrieves keys of various realms. This arc promotes goal achievement and delayed gratification by using a gamified framework of learning. Nell acquires logic, variations and abstract thought in Castle Turing by traversing a castle based on logic gates and puzzles. This architectural simulation would bring about a computational thinking in an interactive, narrative style. Through the appointment of head of a group of mice, Nell develops characters of leadership, planning and empathy. The training and commanding of her mouse army make her to learn collaborative learning and gain ethical leadership. She addresses the issue of self worth, autonomy and emotional intelligence through the Tale of Princess Nell. The fairy tale is a reflection of her life in reality that organized emotional development and formation of identity with the help of the reflection of the story. Nell is courageous when she faces the Dragon and the Crypt and starts to deal with a trauma. The dragon is a representation of her past of abuse and the crypto-grotto provides a field to work on narrative exposure of therapeutic nature and symbolic resolution. In her escapades into Enchanted Forest, Nell is involved with the curiosity and question. The forest has puzzles and inspires memorization of discovery learning and play contribution where an open-ended inquiry is favored. Through close textual examination of the tales that the Primer was telling, it became apparent that the fiction story telling will aid in educating Nell about not only academic studies, but also emotional, critical and survival skills.

One of the key contributors behind the voice and the emotion behind Nells Primer is the character of Miranda a ractor (interactive actor) behind the screen. Miranda is made the live voice behind the Primer of Nell. She does not know Nell well initially but when Nell recites the tales of the Primer, she ends up being very concerned when it comes to Nell. Miranda starts to shape her performances to Nell emotionally, and Miranda is reacting to her fears, inquiries, and development. As time passes she turns out to be like a surrogate mother who gives empathy, advice, and some sense of stability which Nell doesn't have at home. She offers scaffolding learning that answers the emotional and cognitive state of Nell with customised stories to allow both an emotional and intellectual learning process. The presence of Miranda makes it a dynamic pedagogical object of changing the Primer into an active device, changing the view of Vygotsky that believes the tools are socialized. As Tyler and Moore contend, through storytelling as a means of learning, it can be employed as a pedagogical tool to foster the various substantive levels of learning and behavioural practices that stimulate learning. Such is the way the fictional story telling was both primitive and the powerful method.

The Primer imitating the developmental stage that Nell is on is also similar to the behavior of artificial intelligence-powered tutors, such as 'ChatGPT' and 'Khanmigo' that respond to user input with a personalized message. They mimic dialogic learning, scaffold cognition and scale the tone and difficulty in real time like the voice modulation and narrative slow-down in the Primer (OpenAI; Khan Academy). The quest-style of the Primer - e.g. the four keys and Castle Turing- is similar to gamified platforms such as 'Duolingo' and 'Classcraft,' wherein challenges, rewards, and plots keep the learner interested. Such systems encourage and foster goal-setting, perseverance, and engagement type of user interaction by means of storytelling (Duolingo; Classcraft). The example of Miranda as a ractor is an example of a hybrid pedagogy, where human teachers are mediating AI-generated content. The given model is becoming more common in blended learning settings, where educators implement AI tools to customize the delivery and give emotional and moral support. The Primer therefore envisions a post-apocalyptic world in which human empathy and machine intelligence will co-produce valuable learning experiences (Bayne 703; Holmes et al. 22).

In conclusion, The Diamond Age by Neal Stephenson is a futuristic design of digital learning based on adaptive storytelling. Nell with the Primer, the story of Nell developing as a child of neglect expands into the development of a student of cognitive, emotional, or ethical learning because wisdom is supported by stories. The possibilities offered by the device to adapt content individually, based on feelings, and using metaphorical learning matches the postulates of Vygotskian theory and the modern theory of learning and teaching psychology. The other humanization of the process of pedagogy in Miranda is his involvement as a ractor created through the way of empathy and story. With the uncertainty of future education systems regarding more engaging and inclusive ways of learning, the Primer is a fairly attractive prototype of how learning technology should be in the future, with superficial fiction being applied to the acquisition of practical skills in reality and self-improvement. A combination of these findings supports the idea that speculative fiction can be used in educating how the real world should be designed.

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