Gamifying Coding Education for Beginners: Empowering Learners with HTML, CSS and JavaScript

Santhush Chandrasekara[1*], Dileep Hewavitharana[2], Maleesha Weerasinghe[3] , Binod Gayasri[4], Dinuka Wijendra[5], Dilshan De Silva[6]

[1]*Department of Computer Science and Software Engineering, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, it21189494@my.sliit.lk*

[2]*Department of Computer Science and Software Engineering, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, it21189630@my.sliit.lk*

[3]*Department of Computer Science and Software Engineering, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, it21226632@my.sliit.lk*

[4]*Department of Computer Science and Software Engineering, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, it21211164@my.sliit.lk*

[5]*Department of Information Technology, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, dinuka.w@sliit.lk*

[6]*Department of Information Technology, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka, dilshan.i@sliit.lk*

Traditional coding education often fails to engage and motivate beginners due to its lack of interactivity and personalized learning experiences. This paper presents a gamified learning platform designed to teach Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript (JS) to beginners. The platform incorporates interactive lessons, AI (Artificial Intelligence)-powered coding assistance, and advanced gamification mechanics to enhance learner motivation, engagement, and success. Furthermore, key features include performance-based recommendation engines, virtual coding environments with real-time feedback, and a collaborative platform for peer interactions. The integration of AI provides personalized feedback and adaptive learning paths, while gamified elements such as badges, points, and leaderboards foster competitive and enjoyable experiences. Preliminary findings demonstrate a 40% increase in student engagement metrics and a 35% improvement in coding competency compared to traditional methods. This research lays the groundwork for future expansion to additional programming languages and broader educational applications, with potential implications for transforming computer science education on a scale.

Keywords: *artificial-intelligence, e-learning, education, gamification, programming*

Paper No: ITE-08 **Information Technology and Education**