

Implementing Experiential Learning in App Development Instruction

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Annotated Bibliography

Arjmandi, M., Woo, M. W., Mankelow, C., Loho, T., Shahbaz, K., Auckaili, A., & Thambyah, A.

(2023). Embedding computer programming into a chemical engineering course: The impact on experiential learning. *Education for Chemical Engineers, 43*, 50-57.

Arjmandi et al. (2023) explore the integration of computer programming workshops and assessments within a chemical engineering course, aiming to enhance students' problem-solving skills using computational tools. This aligns with the objectives of the App Creators training course, which seeks to equip instructors with practical skills in app development to facilitate effective teaching. The study underscores the importance of experiential learning in developing hands-on proficiency, a crucial aspect for your project's target audience of instructors. By incorporating programming into the curriculum, the researchers provide students with practical experience in applying theoretical concepts to real-world problems. This parallels the need for App Creators instructors to gain authentic app development experience to effectively guide their students. The findings regarding the influence of students' programming backgrounds on their learning experiences and critical thinking approaches are particularly relevant. Understanding the diverse backgrounds of App Creators instructors and tailoring the curriculum to accommodate these differences can enhance engagement and learning outcomes. Additionally, the study highlights the value of soliciting feedback from participants to refine teaching strategies, a practice that can be applied in the iterative development of the App Creators training course. Overall, this research contributes valuable insights to the design and implementation of practical modules within educational programs, offering guidance for optimizing the App Creators curriculum to foster effective experiential learning among instructors. By grounding their study in experiential learning theory, the researchers emphasize the critical role of direct experience in the learning process. Their findings reveal how integrating programming activities provides students with concrete experiences to inform their understanding of core engineering concepts.

Bergsteiner, H., & Avery, G. C. (2014). The twin-cycle experiential learning model:

reconceptualising Kolb's theory. *Studies in Continuing Education, 36*(3), 257-274.

This article by Bergsteiner and Avery provides a critique of existing experiential learning models, particularly Kolb's learning cycle. They identify limitations in categorizing learning styles and activities in these models. The article proposes an integrated Twin Cycle Experiential Learning Model (TCELM) with two cycles - concrete/active/primary (CoAcPr) and abstract/passive/secondary (AbPaSe). This critique of Kolb's model aligns with other literature questioning its validity. The proposed TCELM model offers a useful way to expand the

theoretical framework for experiential learning. In particular, incorporating passive and secondary learning modes seems relevant for the App Creators program, where instructors absorb knowledge through lectures but also apply it by developing their own apps. The model provides a structured approach to integrate different learning styles that I could apply in assessing the curriculum. This article emphasizes the need to accommodate diverse learning styles and activities within experiential learning. The two cycles of the TCELM model represent a logical way to structure the different modes. As I assess the App Creators curriculum, I should consider how to incorporate opportunities for abstract conceptualization and reflection as well as active development tasks. Blending passive and active learning will enrich the instructors' experiential learning process. The TCELM model gives me a comprehensive framework to analyze the curriculum components.

Ezeamuzie, N. O. (2023). Project-first approach to programming in K–12: Tracking the development of novice programmers in technology-deprived environments. *Education and Information Technologies*, 28(1), 407-437.

The study conducted by Ezeamuzie (2023) investigates the effectiveness of a project-first approach to programming in K–12 education, particularly focusing on novice programmers in technology-deprived environments. The research aims to understand the learning path of novice programmers and identify effective pedagogical strategies for engaging beginners in programming. Through a 10-hour project-first constructionist learning intervention involving 38 students from technology-deprived schools, the study evaluates trends in students' programming ability using statistical analyses. The findings indicate that students' programming ability increased on the first day of the intervention and remained stable throughout, irrespective of the semantics or syntax of the programming language used (Python). However, the features of a program did not conclusively determine programming skills. The study underscores the importance of pedagogies that encourage project-first learning, as evidenced by irregular patterns in students' programming solutions. By highlighting the challenges faced by novice learners in low socioeconomic status environments, the research sheds light on the constructionist model of learning and offers insights for educators. In the context of the App Creators training course, this study provides valuable insights into effective instructional approaches for teaching programming to beginners, particularly in resource-constrained settings. The project-first approach, emphasizing hands-on learning and problem-solving, aligns with the practical nature of app development and can enhance students' computational thinking skills. Educators can draw on the findings to design curriculum and instructional strategies that cater to the diverse needs of novice programmers, fostering a supportive learning environment conducive to skill development and knowledge acquisition. Drawing on constructivist learning principles, the

project-first approach positions students as active creators of knowledge through programming projects. This aligns closely with the hands-on, practical nature of app development training in the App Creators program.

Gomez-del Rio, T., & Rodriguez, J. (2022). Design and assessment of a project-based learning in a laboratory for integrating knowledge and improving engineering design skills.

Education for Chemical Engineers, 40, 17-28.

The article by Gomez-del Rio and Rodriguez (2022) explores the implementation and assessment of a project-based learning approach in laboratory sessions for integrating knowledge and enhancing engineering design skills. The study focuses on Mechanical Design, a subject typically included in Chemical Engineering Degrees. By introducing project-based learning to laboratory activities in Mechanical and Chemical Engineering degrees, the authors aim to compare learning outcomes and satisfaction between the two disciplines. The project-based learning methodology, informed by constructivist learning theory, emphasizes active learning and the construction of knowledge through hands-on experience and problem-solving. The authors integrate innovative manufacturing technologies such as 3D printing and Digital Image Correlation (DIC) to enhance student engagement and motivation. Before each practical session, students are provided with online resources to familiarize themselves with fundamental concepts. The lab activities involve designing a bridge model, applying prescribed boundary conditions and forces, and selecting materials for additive manufacturing. This project not only reinforces mechanical knowledge but also promotes teamwork, decision-making, and creativity among students. By actively engaging in problem-solving and collaborative design processes, students develop transferable competences crucial for their professional development. The study highlights the importance of aligning pedagogical approaches with educational objectives and the challenges involved in implementing project-based learning in engineering courses. Despite the encouraging results, the authors acknowledge the need for further improvements to streamline lab activities and enhance learning outcomes effectively. In the context of the App Creators training course, this study offers valuable insights into integrating project-based learning methodologies to enhance students' understanding of app development concepts and improve their problem-solving and design skills. By adopting a constructivist approach and incorporating hands-on activities, educators can create engaging learning experiences that prepare students for real-world challenges in app development. Furthermore, the emphasis on teamwork and creativity aligns with the collaborative nature of app development projects, making this approach particularly relevant for the training program.

Kolb, J., Masłowski, L., & Schallmo, D. (2023). Introduction of a Sustainability-enabled Assessment Framework for Digital Technologies (SAFT). In *ISPIM Conference Proceedings* (pp. 1-19). The International Society for Professional Innovation Management (ISPIM).

The paper by Kolb, Masłowski, and Schallmo (2023) introduces a Sustainability-enabled Assessment Framework for Digital Technologies (SAFT), addressing the dual challenges faced by companies today: digital transformation and sustainability. As companies strive to innovate and stay competitive, they must navigate the integration of digital technologies while also minimizing their environmental footprint. The SAFT framework offers a systematic approach to assess digital technologies based on sustainability factors, technology potential, and fit to the company's objectives. In the context of the App Creators training course, the SAFT framework provides valuable insights for evaluating the digital tools and technologies utilized in app development. By considering sustainability factors alongside technological potential and alignment with educational objectives, instructors can make informed decisions about which tools to incorporate into the curriculum. For example, the framework could help assess the environmental impact of different programming languages or development platforms used in app creation, enabling educators to select options that minimize energy consumption or promote sustainable practices. Moreover, the SAFT framework's emphasis on technology assessment and alignment with company objectives resonates with the goals of the App Creators training program. Just as companies must choose digital technologies that align with their business strategy and sustainability goals, educators designing the curriculum for app development courses must select tools and methodologies that support the learning objectives of the program. By adopting the SAFT framework, instructors can ensure that the digital technologies integrated into the training course not only facilitate app development but also contribute to a sustainable learning environment.

Mughal, F., & Zafar, A. (2011). Experiential learning from a constructivist perspective: Reconceptualizing the Kolbian cycle. *International Journal of Learning and Development*, 1(2), 27-37.

Mughal and Zafar (2011) critically analyze Kolb's experiential learning model through a constructivist lens, identifying its individualistic and deterministic limitations. They propose integrating psychoanalytic, situative, critical cultural, and enactivist perspectives to enhance the

model's comprehensiveness. This article offers valuable insights into reconceptualizing experiential learning, aligning theory with contemporary educational practices. The assessment of Mughal and Zafar's analysis highlights the thoroughness of their critique and the practical suggestions for improvement. By comparing Kolb's model with alternate perspectives, they contribute to a deeper understanding of experiential learning. The proposed reconceptualization demonstrates a nuanced approach to theory-practice integration, offering implications for curriculum design and instructional practices. Incorporating insights from Mughal and Zafar's study into the theoretical framework of my project should enrich my analysis and recommendations. Their framework provides a lens for evaluating existing experiential learning models and guiding curriculum redesign efforts. By integrating perspectives from psychoanalytic, situative, and critical cultural theory, the authors enrich the individualistic focus of Kolb's model and address the learning process in its broader social context. Drawing on their work, I can assess how well the App Creators instructor training program aligns with constructivist principles and identify areas for enhancement, particularly in terms of fostering reflection and considering socio-cultural influences on learning.

Radović, S., Hummel, H. G., & Vermeulen, M. (2023). The mARC instructional design model for more experiential learning in higher education: theoretical foundations and practical guidelines. *Teaching in Higher Education*, 28(6), 1173-1190.

This article presents the mARC model as a framework for designing experiential learning environments in higher education. The model incorporates three key pillars - *authenticity*, *reflection*, and *collaboration*. Authentic learning connects students to real-world contexts. Reflection allows students to develop theoretical perspectives from experience. Collaboration provides diverse viewpoints for deeper reflection. The iterative mARC model guides curriculum design through stages focused on each pillar. This is a well-researched conceptual article that synthesizes prior literature on experiential learning. The mARC model seems particularly relevant for teacher education, where authentic classroom experience, reflective practice, and peer learning are critical. The model provides practical guidelines for instructional design, with flexibility for adaptation across domains. The cyclical iterative approach is appropriate for experiential learning. This article will help inform the theoretical framework of my project. I can apply insights from the mARC model in critiquing and redesigning the curriculum of the App Creators instructor training program. As an experiential learning curriculum, it should incorporate authentic app development tasks. It should provide structured guidance for reflective practice among the instructor cohort. Collaboration will be built in, but can be strengthened based on mARC guidelines. Building on foundational experiential learning theory, the mARC model incorporates contemporary perspectives on authentic learning, critical reflection, and

social pedagogies. This provides a comprehensive theoretical basis for designing engaging experiential learning environments. This article will guide my analysis and recommendations.

References

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