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Development Of a Project-Based Contextual Learning Model for The Course on Human-Computer Interaction

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ABSTRACT

This study aims to develop and implement a Project-Based Contextual Learning (PBCL) model to enhance the effectiveness of teaching the Human–Computer Interaction (HCI) course. The research employed a Research and Development (R&D) approach using the 4-D model, which includes the stages of Define, Design, Develop, and Disseminate. The PBCL model was designed to integrate contextual learning principles with project-based tasks, enabling students to connect theoretical knowledge with practical applications. The results indicate a significant improvement in student learning outcomes. The average score increased from 61.5 in the pretest to 84.7 in the posttest, with a gain score of 23.2 points. Competency in interface design also improved, with the proportion of competent students rising from 36% to 82%. Observations showed higher levels of engagement and collaboration, while survey responses revealed that 87% of students perceived the PBCL model as meaningful, motivating, and relevant to real-world contexts. In conclusion, the PBCL model effectively enhances cognitive achievement, practical skills, and student motivation in the HCI course. This model offers a promising pedagogical framework that can be applied to other technology-related courses requiring the integration of conceptual understanding and practical competencies.

1. Introduction

The development of a project-based contextual learning model for a human–computer interaction (HCI) course builds on both the traditions of studio-based instruction and the more recent innovations in experiential and constructivist pedagogies. In HCI education, teaching models such as the portfolio-oriented prototype walkthrough (C. Hundhausen et al., 2011), (C. D. Hundhausen et al., 2012) and game design projects (Santana-Mancilla et al., 2019) demonstrate how integrating project work with contextual scenarios can enhance students' abilities to design and evaluate user interfaces within real-world constraints. This integration not only helps students internalize theoretical concepts through hands-on experience but also encourages a deeper understanding of the design, usability, and innovation challenges unique to HCI.

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A key component of this model is its emphasis on contextuality. By grounding projects in authentic scenarios—such as simulating a prototype walkthrough where a student team iteratively refines a user interface while receiving immediate feedback from peer "test users" (C. Hundhausen et al., 2011)(C. D. Hundhausen et al., 2012) students are provided with a dynamic environment that reflects industry challenges. This approach leverages the benefits of studio-based learning traditionally utilized in fields like architecture and fine arts, and adapts them to the needs of HCI education (C. Hundhausen et al., 2011)(C. D. Hundhausen et al., 2012). Moreover, projects centered on designing interactive prototypes or game-based interfaces have demonstrated that students benefit significantly from engaging in tasks that require both creative ideation and practical appraisal (Santana-Mancilla et al., 2019) (Granollers et al., 2008)

The model further incorporates elements of service-dominant logic, where value is co-created between students and end users. This approach emphasizes experiential learning through active participation in projects that mirror large industrial or societal challenges (Culén & Karahasanovic, 2022); . By integrating active learning methodologies such as value co-creation, reflective practice, and iterative feedback cycles, the instructional model not only supports knowledge transfer but also cultivates the soft skills necessary for multidisciplinary collaboration and innovation (Culén & Karahasanovic, 2022); . The service-dominant framework enriches project-based learning by contextualizing technological solutions in real-world scenarios, thus aligning educational outcomes with the expectations of professional practice.

Additionally, empirical studies on active learning and project-based education in HCI have shown that students' engagement and motivation increase when they are involved in tasks that connect classroom learning with practical applications (Kang et al., 2022). Experiential activities help students not only learn technical skills but also develop cognitive and emotional competencies through collaboration and problem-solving in a controlled yet realistic environment Yan-yan, 2022). This dual focus on technical proficiency and contextual understanding is essential for the development of proficient HCI professionals.

To enhance students' interface design competencies in the Human-Computer Interaction (HCI) course, the development of a contextual project-based learning model can serve as an innovative approach that integrates theoretical aspects with real-world practice. This approach aligns with the principles of Outcome-Based Education (OBE), which explicitly and measurably defines learning outcomes, and is supported by the Project Based Learning (PjBL) method, which is structured through stages from the introduction, exploration of the problem context, solution design, implementation, to evaluation (Anggraeni et al., 2025) (Dewi Lestari, 2025)

The learning model should be designed contextually so that the material and project assignments are tailored to the needs and challenges of the interface design industry. This contextual approach allows students not only to understand the basic concepts of human-computer interaction, but also to hone their critical analysis and problem-solving skills through real-world case studies. Thus, students can connect theory with practice, for example through defining relevant problems, designing user-friendly interfaces, and evaluating through prototyping and usability testing (Sihombing et al., 2023), (Susanty, 2020) (Ngibad, 2020)(Susanty, 2020)(Kholijah et al., 2023)(G. Kholija, C. Sormin, 2023). The PjBL stages These stages can be adapted from the 4-D development model (Define, Design, Develop, Disseminate), which has proven effective in the context of project-based learning (Muis & Dewi, 2022).

Integrating these diverse approaches into a cohesive project-based contextual learning model involves several key instructional components. First, the curriculum should adopt a spiral approach where theoretical learning, project work, and reflective practice are interwoven throughout the course (C. Hundhausen et al., 2011), (Santana-Mancilla et al., 2019). Second, practical assignments, such as prototype walkthroughs and case-based projects, should be designed to encourage both individual and group contributions, ensuring that students experience the full cycle of design, evaluation, iteration, and implementation (C. Hundhausen et al., 2011)(C. D. Hundhausen et al., 2012), (Granollers et al., 2008). Finally, instructors should employ assessment strategies that capture both process and product, thereby reinforcing the value of contextual learning and active participation (Culén & Karahasanovic, 2022), (Karahasanović & Culén, 2021); (Kang et al., 2022).

Concluded synthesizing principles from studio-based instruction, service-dominant logic, and project-based learning, a robust contextual learning model for HCI education can be developed. This model not only addresses the technical competencies required in the field but also ensures that students are prepared for the real-world complexities of human–computer interaction. The integration of iterative design practices, collaborative projects, and reflective assessments creates a learning environment that is both innovative and deeply contextual, ultimately bridging the gap between theoretical instruction and practical application (C. Hundhausen et al., 2011) (Culén & Karahasanovic, 2022), (Kang et al., 2022), (Belkhouja et al., 2023)

2. Methodology

This study develops a contextual project-based learning model for the *Human–Computer Interaction* course by integrating the Research and Development (R&D) approach with Project-Based Learning (PjBL) principles. “This study adopts the 4-D model (Define, Design, Develop, Disseminate) as its primary research framework (Suhartono et al., 2022).

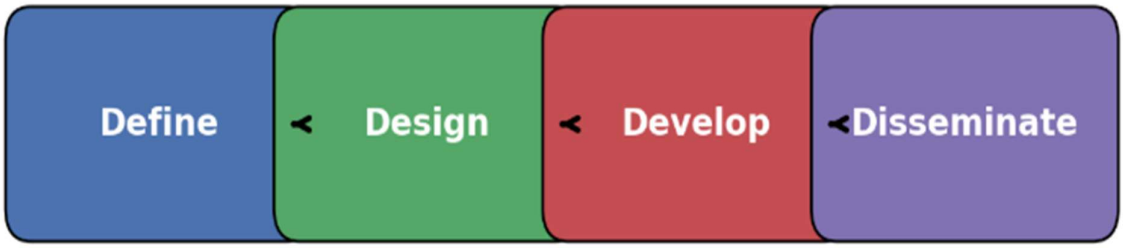

Fig. 1. The 4-D Model

Research stages, Define : A needs analysis was conducted through literature review, classroom observations, and in-depth interviews to identify competency gaps in interface design among students (Kartadireja et al., 2024). Design – Development of a course syllabus, semester learning plan, contextual project-based modules, and assessment instruments, integrating theoretical concepts with practical activities such as case studies and interactive workshops (Herowati & Azizah, 2019)).

Develop – Creation of prototype learning materials (workbooks, project guidelines, assessment rubrics, and supporting simulation applications) validated by experts in Human–Computer Interaction. Disseminate/Evaluate – Pilot implementation with students following PjBL stages (introduction, driving questions, project planning, implementation, and presentation),

accompanied by formative and summative evaluations. Model Revision – Refinement of materials, teaching strategies, and assessment tools based on feedback from students, lecturers, and industry practitioners (Dewi Lestari, 2025)

Data collection techniques included interviews, participatory observations, questionnaires, and project documentation. Data analysis was conducted qualitatively using thematic analysis (Braun & Clarke, 2006) and quantitatively using descriptive statistics (mean, percentage, gain score).

3. Results

The application of the Project-Based Contextual Learning (PBCL) model in the Human–Computer Interaction (HCI) course produced significant improvements in students' performance. The pretest and posttest analysis showed a substantial increase in learning outcomes, where the average score rose from 61.5 at the initial stage to 84.7 after the intervention, resulting in a gain score of 23.2 points. This improvement demonstrates the effectiveness of the PBCL model in strengthening students' cognitive achievement.

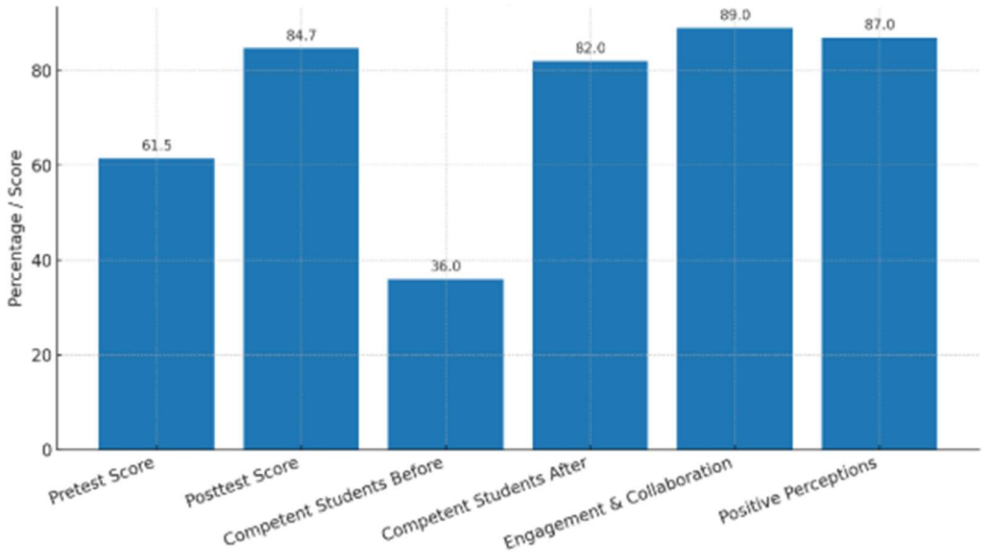

Fig. 1. PBCL Model Implementation in HCI Cource

In terms of competency, students exhibited notable progress in designing and evaluating user interfaces. Prior to the implementation of the model, only 36% of students were categorized as competent. After completing the PBCL-based learning activities, the percentage rose to 82%, indicating a remarkable enhancement in practical skills. The observation during classroom activities also highlighted increased engagement and collaboration among students. Approximately 89% of students reported that working in groups improved their understanding of HCI concepts, particularly through collaborative tasks such as prototyping, usability testing, and iterative design.

Additionally, the survey results revealed positive perceptions of the learning process. A total of 87% of students agreed that the PBCL model made learning more meaningful, motivating, and relevant to real-world applications. The contextual nature of the projects allowed students to apply theoretical knowledge directly in practice, thereby increasing both confidence and learning satisfaction. Overall, the results indicate that the PBCL model effectively enhanced students' knowledge, skills, and attitudes in the HCI course, while also fostering active participation and contextualized learning experiences.

The findings of this study confirm that the Project-Based Contextual Learning (PBCL) model is highly effective in supporting student learning in the Human–Computer Interaction (HCI) course. The significant increase in posttest scores indicates that PBCL successfully enhances cognitive learning outcomes. This aligns with previous research (Thomas & D, 2000), (Suhartono et al., 2022), which highlights that project-based learning provides opportunities for deeper understanding when students are actively engaged in authentic and meaningful tasks.

The improvement in interface design competency demonstrates that contextualized projects allow students to apply theoretical knowledge directly into practice. Such outcomes are consistent with constructivist perspectives, which argue that learning occurs most effectively when learners construct meaning through direct experience. By engaging in real-world design projects, students were able to bridge the gap between abstract concepts and practical application, thereby strengthening their design and problem-solving skills. Besides, the observed increase in engagement and collaboration underscores the social dimension of PBCL. According to Vygotsky's social constructivism, learning is facilitated through interaction with peers and instructors. The collaborative environment created by PBCL encouraged communication, negotiation, and critical thinking, which are essential soft skills for HCI practitioners.

Students' positive perceptions further validate the motivational impact of PBCL. The majority of participants acknowledged that the contextual and project-oriented approach made the learning process more relevant and meaningful. This finding supports earlier studies emphasizing that authenticity and relevance in learning tasks can significantly enhance student motivation and satisfaction. Taken together, these results suggest that PBCL not only improves students' cognitive achievement but also promotes holistic learning by integrating knowledge, skills, collaboration, and motivation. This strengthens the argument that PBCL is a suitable pedagogical approach for HCI education and could be adapted for other courses requiring a balance of theoretical and practical competencies.

4. Conclusions

This study concludes that the Project-Based Contextual Learning (PBCL) model has a significant positive impact on the Human–Computer Interaction (HCI) course. The results show substantial improvements in students' cognitive achievement, practical interface design skills, and collaborative engagement. In addition, students expressed positive perceptions of the learning process, highlighting its relevance to real-world contexts and its ability to enhance motivation. These findings demonstrate that PBCL effectively integrates theory with practice and fosters holistic learning outcomes.

The implications of this study are twofold. First, for educators, the PBCL model offers a promising pedagogical framework to improve the quality of learning in technology-related courses, particularly those requiring both conceptual understanding and hands-on skills. The integration of contextual projects can help students develop critical thinking, problem-solving abilities, and professional competencies that are directly applicable to industry needs. Second, for institutions, adopting PBCL has the potential to strengthen curriculum innovation and align higher education practices with the demands of the digital era.

Future research is recommended to further refine the PBCL model by applying it across different courses and disciplines, as well as exploring its long-term impact on student performance, creativity, and career readiness. Expanding the scope of study with larger and more diverse samples will also provide broader insights into the adaptability and scalability of the PBCL approach in higher education.

References

[1] Anggraeni, I., Mulyanti, D., Marlina, T., & Rahmawati, A. (2025). *A Systematic Literature Review : Model Pembelajaran Berbasis Proyek dalam Meningkatkan Hasil Belajar Siswa*. *9*, 22350–22360.

[2] Belkhouja, T., Yan, Y., & Doppa, J. R. (2023). Dynamic Time Warping Based Adversarial Framework for Time-Series Domain. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *45*(6), 7353–7366. https://doi.org/10.1109/TPAMI.2022.3224754

[3] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*. https://doi.org/10.1191/1478088706qp063oa

[4] Culén, A., & Karahasanovic, A. (2022). Towards responsible interaction design education. *DRS2022: Bilbao*. https://doi.org/10.21606/drs.2022.465

[5] Dewi Lestari, I. A. B. (2025). Implementasi Model Pembelajaran Berbasis Proyek dalam Kurikulum Merdeka di Perguruan Tinggi. *Jurnal Ilmiah Kependidikan*, *11*(2), 129–137. https://doi.org/10.30998/xxxxx

[6] G. Kholija, C. Sormin, G. Z. (2023). *Model-Project-Based-Learning-pada-Mata-Kuliah-Metode-Peramalan.pdf.pdf* (hal. 209–220).

[7] Granollers, T., Oliva, M., García, R., & Gil, R. (2008). Project-Based Learning applied to a Master in HCI. *Interaction Design and Architecture(s)*, *3–4*, 59–66. https://doi.org/10.55612/s-5002-003_4-007

[8] Herowati, H., & Azizah, L. F. (2019). PENGEMBANGAN BUKU KERJA MEDIA PEMBELAJARAN BERBASIS KONTEKSTUAL SEBAGAI PENUNJANG MATA KULIAH MEDIA PEMBELAJARAN. *LENSA (Lentera Sains): Jurnal Pendidikan IPA*. https://doi.org/10.24929/lensa.v9i2.71

[9] Hundhausen, C. D., Fairbrother, D., & Petre, M. (2012). An empirical study of the "prototype walkthrough": A studio-based activity for hci education. *ACM Transactions on Computer-Human Interaction*. https://doi.org/10.1145/2395131.2395133

[10] Hundhausen, C., Fairbrother, D., & Petre, M. (2011). The "prototype walkthrough": A studio-based learning activity for human-computer interaction courses. *ICER'11 - Proceedings of the ACM SIGCSE 2011 International Computing Education Research Workshop*. https://doi.org/10.1145/2016911.2016935

[11] Kang, R., Rantanen, E. M., & Youngstrom, E. A. (2022). Machine Learning in Healthcare: Two Case Studies. *Proceedings of the Human Factors and Ergonomics Society*, *66*(1), 774–778. https://doi.org/10.1177/1071181322661518

[12] Karahasanović, A., & Culén, A. L. (2021). A service-dominant logic based framework for teaching innovation in HCI. *15th International Conference on Interfaces and Human Computer Interaction, IHCI 2021 and 14th International Conference on Game and Entertainment Technologies, GET 2021 - Held at the 15th Multi-Conference on Computer Science and Information Systems, MCCSIS 2021*. https://doi.org/10.33965/ihci_get2021_202105l003

[13] Kartadireja, W. N., Somantri, L., & Sugito, N. T. (2024). Penggunaan Media Berbasis Sistem Informasi Geografis untuk Meningkatkan Kecerdasan Spasial dalam Pembelajaran. *… Pendidikan Geografi*, *9*(3), 138–146. http://jppg.uho.ac.id/index.php/journal/article/view/127%0Ahttps://jppg.uho.ac.id/index.php/journal/article/download/127/55

[14] Kholijah, G., Sormin, C., & Z, G. (2023). Model Project Based Learning pada Mata Kuliah Metode Peramalan. *AKSIOMA : Jurnal Matematika dan Pendidikan Matematika*. https://doi.org/10.26877/aks.v14i2.16253

[15] Muis, A., & Dewi, L. (2022). Day Care Management Course Design Based on OBE and PjBL for Teacher Education of Early Childhood Education Program. *Inovasi Kurikulum*. https://doi.org/10.17509/jik.v18i2.35713

[16] Ngibad, K. (2020). Pelatihan Mendeley Secara Online Bagi Mahasiswa Fikes Umaha Di Masa Pandemi Covid-19. *Pengabdian dan Pemberdayaan Nusantara*, *2*(1).

[17] Santana-Mancilla, P. C., Rodriguez-Ortiz, M. A., Garcia-Ruiz, M. A., Gaytan-Lugo, L. S., Fajardo-Flores, S. B., & Contreras-Castillo, J. (2019). Teaching HCI skills in higher education through game design: A study of students' perceptions. *Informatics*, *6*(2), 1–12. https://doi.org/10.3390/informatics6020022

[18] Sihombing, P. R., Budiantono, S., Arsani, A. M., Aritonang, T. M., & Kurniawan, M. A. (2023). Comparison of Regression Analysis with Machine Learning Supervised Predictive Model Techniques. *Jurnal Ekonomi Dan Statistik Indonesia*. https://doi.org/10.11594/jesi.03.02.03

[19] Suhartono, B., Budi, B., Siahaan, A., Nasution, I., & Syukri, M. (2022). Analisis Metode dan Pendekatan dalam Manajemen Proyek pada Dunia Pendidikan. *Edumaspul: Jurnal Pendidikan*. https://doi.org/10.33487/edumaspul.v6i1.2809

[20] Susanty, S. (2020). Inovasi Pembelajaran Daring Dalam Merdeka Belajar. *Jurnal Ilmiah Hospitality*, *9*(2), 157–166. https://doi.org/10.47492/jih.v9i2.289

[21] Thomas, J. W., & D, P. (2000). A REVIEW OF RESEARCH ON PROJECT-BASED LEARNING. *Learning*.