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Elevated Novice Developer Productivity and Self-efficacy by Promoting UX Journey in Software Requirement Elicitation

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***Abstract*— Objectives: This study explores the effectiveness of the UX Journey methodology in increasing developer productivity and self-efficacy. Materials: The UX journey, consisting of around 30 activities, offers a user-centric approach to developing solutions, with 86 volunteer respondents from 505 populations. Method: Through a comparative analysis of developer productivity metrics and the General Self-Efficacy Scale questionnaire, this study investigates the impact of UX Journey on self-efficacy before and after implementation. Results: The study's findings reveal a significant positive correlation between UX Journey and increased productivity and an association between self-efficacy variables. By incorporating a comprehensive set of activities and a user-centric approach, the UX Journey enables developers to navigate the design process efficiently while gaining a deeper understanding of user needs. The positive correlation between the UX Journey and increased productivity, as well as the relationships between self-efficacy variables, emphasize the value of this methodology in fostering practical design thinking. Implication for Further Research: While this study has limitations regarding sample size and contextual specificity, it provides valuable insight into the benefits of UX Journey and paves the way for further research. In addition, the study focused on specific design projects within a particular context, which might restrict the broader applicability of the results. Significant results indicate that the proposed method is as effective as the elicitation method in general, with the advantage that the developer can understand the needs and empathy of the users. UX journeys can enhance the design process and foster a deeper understanding of users' needs across multiple domains.**

***Keywords*— Developer productivity; UX journey; user experience; user requirement.**

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I. INTRODUCTION

User requirements often become more extensive and change more frequently than they should [1], [2]. This situation can be attributed to several factors [3], [4], such as changes in business processes, incomplete exploration of requirements, misunderstandings about user perceptions, strategic changes within the client organization, stakeholder engagement, communication quality within the development team, better understanding of the technical solution, and the need for preventative measures [4], [5]. When user requirements change rapidly, the entire system is affected, including the rigidity of the software modules [6]. Rapid changes in user requirements can negatively impact the software's quality [7]. Failure to identify user problems during the user requirement software stage can also affect the system's success, mainly if such issues are found during the testing phase, which can be more resource-intensive than if identified during the initial analysis of the system [8].

The issue of eliciting user requirements is a common challenge in software development, and it can occur at different stages of the process. The problem often arises when the developer needs to adequately explore or define user requirements, leading to a mismatch between the software product or service and the needs of end-users or the business. There are several possible reasons for this problem, including a lack of thorough exploration of needs, inadequate development of clear and detailed requirements, failure to identify end-user or business needs appropriately, incomplete coverage of all requirements in the development process, and failure to update requirements throughout the development process to match changing needs [4], [5], [9]. These factors can lead to software development not meeting the intended users' or business's requirements or needs.

Four key features that contribute to the success of software have been identified in previous studies: transparency, changeability, suitability, and complexity [5]–[7], [10], [11]. To increase the success rate of software products or services, developers should possess soft skills that enable them to understand these success characteristics. Comprehension of socio-technical skills is an essential soft skill that allows developers to understand user needs from a human perspective and aligns with the principles of user-collaborative development appropriate for modern development methods [12]–[14]. Self-efficacy is a socio-technical skill that refers to a person's belief in their ability to achieve specific goals. In exploring software requirements, self-efficacy is crucial in determining how well an individual can perform a needs assessment [15], [16]. Developers with solid self-efficacy can effectively identify requirements and develop software that meets end-users' needs and underlying business needs.

To develop the skills of novice developers, educational institutions have a responsibility to shape students' mindsets toward how to think rather than what to think [17]–[19]. The ACM Computing Curricula includes a main course on user requirements, with five competencies students should acquire. These include [20]: (1) identifying and documenting software requirements using established elicitation techniques in collaboration with stakeholders, (2) analyzing software requirements for consistency, completeness, and feasibility and proposing improved documentation, (3) specifying software requirements in standard formats and languages that are understandable to non-experts such as end-users, stakeholders, and managers, (4) verifying and validating requirements using standard techniques like inspection, modeling, prototyping, and test case development, and (5) following the project's identified process and product management procedures as part of the requirements engineering team.

This study examines how developers use socio-technical skills to understand user needs from a consumer perspective. The study will compare commonly used methods with new approaches that can improve the productivity and capabilities of developers. To achieve this, the study will use the UX Journey framework, which integrates user requirements and experience to enhance individual capacity building and help developers improve their skills in eliciting high-quality user requirements and understanding user empathy. The framework can be helpful in both academic and industry settings. The study addresses the research question of how critical thinking can be developed among software requirements courses in individual settings.

II. Materials and Methods

The integration of user experience and user requirements in software development can yield numerous benefits for organizations, end-users, and society. Consequently, the integration of user experience and user requirements is a vital and valuable aspect of the software development process. This study addresses the main research question of how individual developers utilize socio-technical skills to comprehend user needs from the consumer's perspective.

A. Context

Around 500 senior undergraduate students register annually for software requirement courses, integral parts of computer engineering programs. These courses aim to introduce students to the skills required for real-world problem-solving and equip them with the necessary knowledge to become successful software developers [21], [22]. As the design process is a crucial aspect of software development, teaching it to students effectively is essential. Project-based learning has been identified as an efficient teaching method, as it encourages active participation and critical thinking among students, especially in science and engineering courses [17], [23], [24]. Therefore, project-based learning is often adopted in software requirement courses, allowing students to express their opinions and ideas while promoting critical thinking [17].

The chosen software requirement course had many participants in this study, with 505 students enrolled in 2022. To guarantee impartiality in the study, students can participate voluntarily in this project. In computer engineering design courses, teamwork is typically encouraged to promote collaboration and enrich the learning experience [15], [25]. However, in this software requirement course, students are expected to work independently using a set of tools to finish the task within a 14-day timeframe [25]. This approach allows students to develop self-reliance and encourages them to take ownership of their learning experience [15], [16]. Additionally, it provides a fair platform for evaluating individual performance, as each student's work is assessed based on their merit and not on the collective work of a team. Furthermore, it allows students to hone their critical thinking and problem-solving skills by allowing them to work on a challenging project independently.

By conducting the study on this software requirement course, the researchers aimed to identify the effectiveness of project-based learning in promoting critical thinking among students. The study aimed to compare the learning outcomes of the experimental UX Journey, with the former being taught through project-based learning and the latter being taught through standard elicitation methods. This study will help identify the benefits of project-based learning by comparing standard methods and the UX Journey and its potential to improve learning outcomes from software requirements courses.

B. Research Procedure

The design of the research study involved incorporating two project activities, a pre-self-efficacy and a post-self-efficacy, to assess the impact of the intervention on critical thinking, as presented in Figure 1. The students will participate in two experimental group activities. Both groups will work independently during the six-week project-based approach, utilizing the typical elicitation process and the UX Journey. The UX Journey, based on the principles of Design Thinking, promotes divergent and convergent thinking and involves users in resolving complex engineering problems by obtaining feedback from them [26], [27].

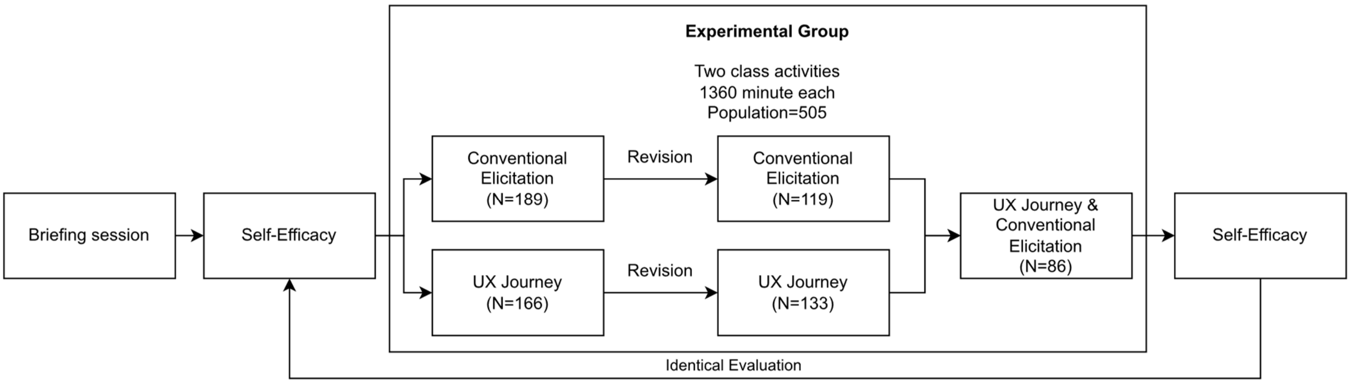

Fig. 1 Research Process

In each project activity, every participant will focus on a specific topic and interact with various stakeholders based on their creative thinking. Collaborative sessions will be conducted, and interventions will be made. The instructor will explain each activity's objectives and expected outcomes to experimental and control groups. Participants will need to submit three progress reports for each project activity. The teacher will ensure that every participant achieves the expected activity targets and provide feedback based on the results. For a more comprehensive explanation of the five activities, refer to Table 1.

TABLE I
PROJECT TOPIC AND ACTIVITY

Project	Topic	Activity	Method
Project 1	Flight booking system	1. Briefing session 2. Pre-self-efficacy 3. Progress 1 4. Progress 2 5. Progress 3 6. Post-self-efficacy	Common elicitation method
Project 2	Train booking system	1. Briefing session 2. Pre-self-efficacy 3. Progress 1 4. Progress 2 5. Progress 3 6. Post-self-efficacy	UX Journey

For students to effectively apply critical thinking skills to unfamiliar situations, they must also develop metacognitive skills [28], [29]. The notion of metacognition has been widely used to describe how students' control, coordinate, and organize their learning strategies, even though it needs to account for the learning process at the individual level fully. In particular, researchers in relevant studies have attempted to explore how individual metacognition develops at the social level [30]. From previous research, there has been an ongoing debate among scholars as to whether metacognitive skills are transferable to group work. However, some studies have suggested that metacognition plays a vital role in group work and that it is an essential component for collaborative learning to be successful. Therefore, metacognition is necessary for learners to reflect on their learning experiences and develop effective learning strategies that can be applied in different contexts. [30]. There are five categories of socially shared regulatory processes that support metacognition [31]: (i) defining goals, which involves understanding the task at hand; (ii) identifying relevant task components and developing a plan to complete them; (iii) setting clear objectives, (iv) monitoring progress, and (v) evaluating progress based on established timelines and actions. The everyday elicitation-based activities and UX Journey were designed based on these categories, as described in detail in Table 2.

TABLE II
IMPLEMENTATION OF METACOGNITION REGULATION

Categories	Common elicitation methods	UX Journey
Goals	Description	Discover a. Field Studies b. SWOT c. Competitor d. Hypothesis e. Identify Behavioral Variable
Identifying relevant tasks	1. Identify stakeholders 2. Choose an elicitation technique 3. Telling user needs 4. Conceptual Diagrams 5. Mockups	1. Personality and ability 2. Explore a. Prepared questions b. Meet Stakeholders c. Findings d. Index cards/sticky notes e. Map interview f. Significant behavior pattern g. Synthesize characteristics and relevant goals h. Check for redundancy and completeness i. Validation j. Verification k. Expand Description and Variable l. Persona m. Customer Journey n. User Scenarios and user stories o. Site map Wireframing
Clear objectives	Identify scope	1. UX Journey Activities Checklist 2. My Goals
Monitoring progress	Progress 1, 2, and 3	Listen a. Progress 1, 2, and 3 b. Follow-up
Evaluating	Define acceptance criteria	Test a. Qualitative & Quantitative selection b. Testing c. Verification d. Objective Behavioural Variables e. Acceptance Criteria

The first activity in this research study (briefing session) emphasizes utilizing a worksheet as a guide to conducting experiments on the common elicitation [1] and UX Journey

[1]. The primary goal of this activity is to develop metacognitive processes among participants. Clear goals and engaging in planning, monitoring, evaluating, and reflecting can support these processes [32]. These activities also promote individual awareness and better comprehension of the content [30]. Monitoring requires self-awareness and observations of one's cognition, behavior, and motivation [32], [33]. To encourage self-observation and reflection, each activity in the general elicitation worksheet and UX Journey encourages students to monitor their progress while completing assignments.

This study's second and third activities revolve around utilizing the common elicitation and UX Journey worksheet to conduct experiments on elicitation techniques that emphasize the user aspect more than just exploring their needs for design solutions. The UX Journey worksheet is designed to encourage the development of meta-cognitive skills by helping students become more self-aware while gaining a deeper understanding of the content. Additionally, the UX Journey worksheet prompts participants to empathize with user problems, a crucial aspect of designing effective solutions. In the second and third activities, participants will be given topics with the same complexity to compare their productivity. This provides an opportunity to evaluate the effectiveness of the elicitation techniques used in the second and third activities. It also allows participants to develop their metacognitive skills further by reflecting on their performance and identifying areas for improvement. By using identical topics (see Table 1 for details on the issues for each project), participants can also better understand how different elicitation techniques can affect the productivity and quality of their design solutions.

Reflection is a crucial part of the metacognitive process that allows participants to evaluate their learning and improve their skills [34]. Reflection involves analyzing the causes of success or failure by evaluating our cognitive behavior and motivation through available information [33]. The implication of reflection: at the conclusion of each activity, students are required to write an individual reflection on their work, which includes their collaborative efforts with stakeholders, a critical evaluation of their performance ((1)-(8)), and the identification of areas that need improvement [35].

$$Unambiguous\ (Q_1) = \frac{n_{ui}}{n_r} \tag{1}$$

$$Correctness\ (Q_2) = \frac{n_c}{n_r} \tag{2}$$

$$Completeness\ (Q_3) = \frac{n_u}{n_i * n_s} \tag{3}$$

$$Understandable\ (Q_4) = \frac{n_{ur}}{n_r} \tag{4}$$

$$Verifiable\ (Q_5) = \frac{n_r}{n_r + \sum_i c(r_i) + \sum_i t(r_i)} \tag{5}$$

$$Internal\ consistent\ (Q_6) = \frac{n_u - n_n}{n_u} \tag{6}$$

$$Precise\ (Q_7) = \frac{n_p}{n_p + n_f} \tag{7}$$

$$Productivity = Q_1 + Q_2 + Q_3 + Q_4 + Q_5 + Q_6 + Q_7 \tag{8}$$

Providing feedback on how students complete critical thinking activities is a very effective method of encouraging their development [36]. Feedback must be given when students can understand it and it is related to the following task [37]. In the third research activity, participants were given general feedback about their previous reflections before being asked to reflect on their work by answering questions like they did in the last activity. These feedback sessions allow students to understand their strengths and weaknesses and improve their critical thinking skills. Terminate this experimental session by giving a questionnaire to evaluate the improvement of their abilities [1].

C. UX Journey

Design thinking has gained widespread recognition in various fields over the last two decades as an effective method for solving complex and interdisciplinary problems [38]. It is a comprehensive approach to addressing design problems with social ambiguity [39]. Characterize it as an exploration of the cognitive processes involved in the design, which are inherent in human cognition [40], [41]. Design objects can take various forms, including products, systems, services, software, artifacts, code lines, database queries, and algorithms. Understanding users' unique needs and expectations is critical, and developers must aim to acquire a deeper understanding of each aspect of the design. To tackle this challenge, design thinking emphasizes empathy, integrative thinking, experimentalism, optimism, and collaboration. A comprehensive examination is necessary to create a project design to generate a model that addresses user concerns. Design thinking uses a framework or model incorporating different techniques to solve design problems. To comprehensively analyze design issues, developers must take a holistic approach. The process of transforming user requirements into design specifications involves both divergent and convergent thinking.

The UX Journey approach is a method that combines user experience and user requirements to identify user needs and solutions [6]. It adopts an iterative approach and involves various UX activities to uncover user problems and solutions. The method is designed to be manageable for individual developers or small teams to execute within a feasible timeframe. To create a successful UX Journey, it is crucial to consider prior models that align with the project's specific goals, such as enhancing self-efficacy in understanding user intent or capturing market potential with innovative product solutions. To create effective design solutions, it is necessary to examine the context holistically, generate ideas, assess solutions, and implement them based on the project's specific goals. Using the framing process, developers can identify or improve new solutions by realigning existing frames, shifting perspectives, or drawing connections to other contexts. The UX Journey approach comprises four activities: discover, explore, test, and listen, as depicted in Figure 2. These activities assist developers in creating effective design solutions and refining them based on user feedback.

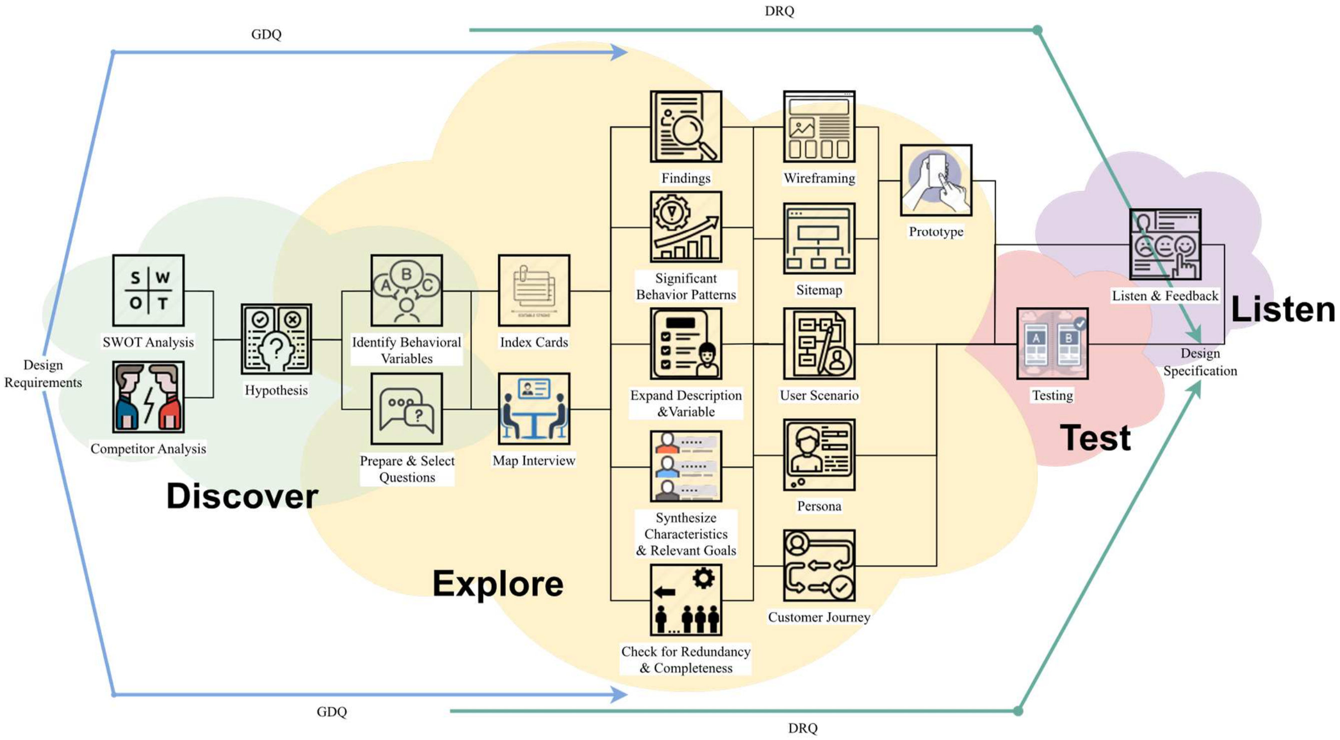

Fig. 2 UX Journey architecture (adapted from [6])

III. Results and Discussion

A. Results

The UX Journey has shown a notable improvement in developer productivity, as evidenced by the analysis of minimum, maximum, and mean values compared to the standard elicitation method. Out of the total population of 505 individuals, 86 respondent volunteers participated in both methods for evaluation. The findings reveal that the minimum productivity margin increased by approximately two points. The maximum score surged from around 35 points to an impressive 98 points, resulting in an average increase of one point. These results strongly suggest that the UX Journey method, overall, has a positive impact on enhancing developer productivity.

A detailed evaluation will be conducted for each activity within the UX Journey method to gain a comprehensive understanding of the findings. The results of this assessment are presented in Tables 3 and 4, which will provide a thorough breakdown of the outcomes achieved in each activity.

TABLE III
PRODUCTIVITY SUMMARY STATISTIC

Variable	Obs	Min.	Max.	Mean	Std. deviation
Common Method	86	0,100	35,650	5,446	3,658
UX Journey	86	2,270	98,240	6,400	10,158

TABLE IV
STATISTICAL ANALYSIS

UX Journey				**Common Elicitation**			
Activities	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Activities**
Personality and ability	1	40	11,3 (6,7)	2,0	30,0	12,1(4,2)	Identify stakeholders
Activities Checklist	1	480	16,9 (51,7)	15,0	60,0	26,8(7,9)	Define the scope
My Goals	1	480	21,8 (52,7)	5,0	30,0	13,7(6,3)	Choose elicitation techniques
Field Studies	2	180	22,7 (25,1)	20,0	200,0	122,3(38,6)	User Stories
SWOT	3	200	27,8 (27,5)	20,0	150,0	51,0(22,6)	Conceptual Model Diagrams
Competitor	1	60	17,6 (13,7)	20,0	1440,0	757,9(313,6)	MockUps
Hypothesis	2	105	21,6(20)	10,0	120,0	56,9(15,5)	Define acceptance criteria
Identify Behavioral Variable	1,6	105	18,7(15,7)				
Prepared questions	2	67	20,3(13,1)				
Meet Stakeholders	1,6	220	30,5(32,2)				
Findings	2	120	19,7(20,3)				
Index cards/sticky notes	3	350	33,4(40,4)				
Map interview	2	140	26,9(22,5)				
Significant behavior pattern	2	70	19,7(14,8)				
Synthesize characteristics and relevant goals	1	60	17,8(14,1)				
Check for redundancy and completeness	0,5	60	15,7(14,3)				
Validation	0,1	90	15,2(15,7)				

UX Journey				Common Elicitation			
Activities	Min	Max	Avg	Min	Max	Avg	Activities
Verification	0,1	60	16,5(12,7)				
Expand Description and Variable	2	60	15(11,3)				
Persona	4	90	23,3(17,8)				
Customer Journey	2	73	32,1(17,6)				
User Scenarios and user stories	1,3	90	28,5(18,5)				
Site map	1,2	120	20,6(16,9)				
Wireframing	1,6	600	105,6(110,3)				
Qualitative & Quantitative selection	1,4	60	14(12,7)				
A/B Testing	0	120	39,4(29,5)				
Verification	0	90	15(14,6)				
Objective Behavioral Variables	0,1	60	14,6(12,1)				
Acceptance Criteria	3	140	38(31,5)				
Follow up	1	155	12,3(17,5)				

The UX Journey methodology encompasses approximately 30 activities throughout each design solution's development process. In contrast, general elicitation techniques typically involve a smaller number, ranging from 1 to 10 activities. This study's general elicitation activities were limited to seven commonly used main activities. However, despite the higher number of activities involved in the UX Journey, the time records gathered from these activities were lower when compared to the specifically designed general elicitation techniques used in this study. This observation implies that the UX Journey methodology offers a more efficient and streamlined approach to the design process, resulting in reduced time requirements without compromising the quality of the outcomes.

The data collected further revealed a positive correlation between the implementation of the UX Journey and increased developer productivity. This suggests that incorporating the UX Journey methodology can significantly enhance the efficiency and effectiveness of developers in their design efforts. By engaging in a more structured and comprehensive set of activities, developers can gain valuable insights and make informed decisions that positively impact their productivity.

One of the key distinguishing features of the UX Journey is its explicit focus on gaining a deeper understanding of users. The methodology is designed to explore user needs, preferences, and behaviors, enabling developers to create design solutions that align more closely with user expectations. The UX Journey aims to enhance the final product's overall user experience and satisfaction by prioritizing user-centric approaches.

The UX Journey methodology stands out for its extensive set of activities and its emphasis on user understanding. The study findings indicate that the UX Journey offers a more efficient design process and contributes to increased developer productivity. By leveraging the insights gained through the UX Journey, developers are better equipped to deliver design solutions that cater to user needs and preferences, ultimately leading to improved user experiences.

In the final phase of this study, the researchers compared the impact of using the UX Journey on participants' self-efficacy. To assess self-efficacy levels, the researchers utilized the General Self-Efficacy Scale adapted from [42] questionnaire before and after the participants engaged in the UX Journey. By comparing the pre- and post-intervention results, the researchers aimed to determine if there were any notable changes in participants' self-efficacy. The analysis of the collected data involved using a Pearson Correlation Matrix (see Table 5), which allowed the researchers to examine the relationships between different variables.

TABLE V
PEARSON CORRELATION MATRIX

Var.	A	B	C	D	E	F	G	H	I	J
A	1,00	0,46	0,44	0,54	0,50	0,43	0,49	0,57	0,53	0,57
B	0,46	1,00	0,29	0,40	0,38	0,38	0,33	0,55	0,46	0,46
C	0,44	0,29	1,00	0,65	0,56	0,52	0,59	0,51	0,54	0,50
D	0,54	0,40	0,65	1,00	0,44	0,48	0,52	0,62	0,62	0,59
E	0,50	0,38	0,56	0,44	1,00	0,53	0,47	0,53	0,55	0,49
F	0,43	0,38	0,52	0,48	0,53	1,00	0,56	0,65	0,48	0,48
G	0,49	0,33	0,59	0,52	0,47	0,56	1,00	0,53	0,52	0,47
H	0,57	0,55	0,51	0,62	0,53	0,65	0,53	1,00	0,51	0,52
I	0,53	0,46	0,54	0,62	0,55	0,48	0,52	0,51	1,00	0,59
J	0,57	0,46	0,50	0,59	0,49	0,48	0,47	0,52	0,59	1,00

The results indicated that all the variables exhibited significant correlations, as determined by a significance value of alpha = 0.05. This implies that the variables assessed in the study were interconnected and influenced one another. The lowest correlation value was observed among the variables examined between variable A (reflecting the belief that one can find means and ways to overcome opposition) and variable C (indicating the ease of sticking to aims and accomplishing goals). This correlation highlights the relationship between individuals' ability to set goals and their determination to achieve them. The findings from Table 4, which presents the results of the Activities Checklist and My Goals activities, support this observation. The Activities Checklist and My Goals activities within the UX Journey were designed to allow participants to set clear goals and work towards achieving them. The correlation between variable A and variable C suggests that participants who believe they can find ways to overcome obstacles are more likely to maintain their focus and accomplish their goals. These findings emphasize the significance of goal setting and perseverance within the UX Journey methodology. The study results indicate that engaging in the UX Journey can positively influence participants' self-efficacy. By incorporating activities encouraging goal setting and determination, the UX Journey empowers individuals to enhance their self-belief and increase their confidence in overcoming challenges. This, in turn, contributes to developing a stronger sense of self-efficacy among participants.

B. Discussion

The results of this study demonstrate the potential of the UX Journey methodology in enhancing developer productivity and self-efficacy. By comparing the UX Journey with general elicitation methods, it is evident that it yielded lower time records despite involving a higher number of activities. This suggests that the UX Journey allows developers to navigate the design process efficiently while focusing on understanding user needs. The correlation analysis revealed significant relationships among various self-efficacy variables assessed using the General Self-Efficacy Scale questionnaire. The findings highlight the importance of goal setting and perseverance in achieving desired outcomes. Moreover, the correlation between the ability to find means to overcome opposition and the ease of sticking to aims and accomplishing goals underscores the role of individual determination and goal-directed behavior.

The UX Journey's emphasis on activities such as the Activities Checklist and My Goals contributes to the positive correlation between goal-setting and self-efficacy. By encouraging participants to set clear goals and providing them with the tools to work towards them, the UX Journey fosters a sense of self-belief and confidence in participants' ability to tackle challenges effectively. These findings underscore the value of the UX Journey as a methodological approach to design thinking. It not only enhances productivity but also promotes self-efficacy among developers. By integrating user experience, user requirements, and a comprehensive understanding of the design context, the UX Journey provides a framework for creating effective design solutions. The sample size was limited to 86 respondents, and the study focused on specific design projects within a particular context. Future research should consider a larger, more diverse sample to generalize the findings.

Additionally, investigating the long-term effects of the UX Journey on developer productivity and self-efficacy would provide valuable insights into its sustained impact. The UX Journey methodology offers a holistic and iterative approach to design thinking that can positively influence developer productivity and self-efficacy. Its incorporation of goal-setting activities and its emphasis on understanding user needs contribute to its effectiveness in creating innovative and user-centric design solutions. Further research and application of the UX Journey across various domains are warranted to explore its potential and benefits fully.

IV. Conclusion

In conclusion, the findings of this study highlight the effectiveness of the UX Journey methodology in enhancing developer productivity and self-efficacy. By incorporating a comprehensive set of activities and a user-centric approach, the UX Journey enables developers to navigate the design process efficiently while gaining a deeper understanding of user needs. The positive correlation between the UX Journey and increased productivity, as well as the relationships between self-efficacy variables, emphasize the value of this methodology in fostering practical design thinking. Despite the promising results, it is essential to acknowledge the limitations of this study. The sample size was relatively small, consisting of 86 respondents, which may limit the generalizability of the findings.

Additionally, the study focused on specific design projects within a particular context, which might restrict the broader applicability of the results. Future research should include more diverse samples to validate and extend these findings. There are several avenues for future work to build upon the present study. Investigating the long-term effects of implementing the UX Journey on developer productivity and self-efficacy would provide valuable insights into the sustained impact of this methodology.

Furthermore, comparative studies between the UX Journey and other design thinking approaches could shed light on each method's advantages and limitations. Additionally, exploring the application of the UX Journey across different domains and industries would expand our understanding of its effectiveness in diverse contexts. Finally, incorporating qualitative research methods, such as interviews or observations, could provide deeper insights into the experiences and perceptions of developers using the UX Journey. Overall, further research and application of the UX Journey are needed to fully explore its potential and implications in design thinking.

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