

Brewing Ideas: An Experience Report on the Use of World Café's to Spin on Collaborative Learning of Software Development Life Cycles

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ABSTRACT

Context: In Software Engineering Education, there is a continuous search for methods that might promote active and collaborative learning is ongoing. While many active learning strategies have been explored, few emphasize facilitating information exchange among students themselves. **Goal:** This study investigates the World Café technique's effectiveness in a Software Engineering classroom, focusing on enhancing understanding of Software Development Life Cycles and fostering collaborative learning. **Research Method:** Over four weeks, we integrated the World Café into a Software Engineering class. We assessed (i) students' comprehension, experiences, and perceptions of the technique's support for learning and collaborating and (ii) the perceived usefulness, ease of use, intention of use, and potential external factors impacting the technique's adoption. **Results:** Our study had 17 student participants and our findings suggest that World Café can facilitate high-quality collaborative learning. Students also identified constraints like limited time, low host engagement, and inadequate discussion materials as potential challenges. **Contributions and Final Remarks:** This report provides insights into the World Café technique's potential in Software Engineering Education, particularly for teaching software development life cycles and other content areas, emphasizing its potential for broader applicability.

CCS CONCEPTS

• **Social and professional topics** → Computing education.

KEYWORDS

Collaboration, Learning, Software Development

1 INTRODUCTION

Software Engineering Education (SEE) aims to provide students with the knowledge, skills, and competencies required to become effective software engineers. This includes not only technical knowledge but also a broader understanding of how to design, develop, test, maintain, and manage software in a variety of contexts [20]. Ensuring high-quality education in SE is crucial to producing skilled

professionals, ready to tackle contemporary technological challenges and drive sustainable innovations in the industry.

Investigations within the SEE domain are focused on enhancing the learning process. For example, Garousi et al. [11] provided a comprehensive list of best practices in SEE, emphasizing that collaboration, especially with industry participants, is essential for effective learning. Moreover, Rodrigues et al. [24] highlighted the significance of aligning SE theory with practical activities to strengthen student competencies. They suggested integrating gamification with flipped classroom methodologies and warned against a heavy dependence on strictly theoretical pedagogical strategies, as this could leave Computer Science students inadequately equipped for the ever-evolving nature of the software industry.

In this context, active learning methodologies have been in the spotlight in SEE. These methodologies place students at the center of the learning experience, with educators transitioning from traditional lecturing roles to facilitators, guiding students through autonomous exploration and problem-solving [24]. By using techniques such as Problem-based Learning (PBL) or Challenge-based Learning (CBL), students engage with real challenges, emulate professional scenarios, and acquire skills essential for high-quality software engineering practice [22]. However, despite these techniques proving to be effective, challenges still remain in the field of SEE, such as identifying teaching methods that emphasize collaboration in the learning process.

Heckman et al. [13] argue that large class sizes can hinder group dynamics and limit the adaptability of SE instruction. They suggest a need to explore methods that encourage student collaboration, with a particular emphasis on interactions in smaller groups to cultivate a collaborative learning environment. Drawing from a decade of experience teaching SE, the authors underscore the importance of soft skills, such as teamwork, for student success. Similarly, a survey of over 600 professionals in the software industry ranked teamwork as the second most vital interpersonal skill in Software Engineering, surpassed only by critical thinking [1].

In this scenario, our paper reports an experience on the use the World Café [4], a deeply collaborative technique, to assess its efficacy for collaborative learning in SE. Our study focused on classes centered around the learning of different Software Development Life Cycles (SDLCs). Thus, this report contributes by shedding lights on the potential of World Café in SEE, offering advantages to educators, students, and professionals in software development.

This paper is structured as follows: Section 2 provides a brief introduction to SDLCs, active and collaborative learning in SE, and the World Café technique. In Section 3, we detail our research methodology, including the stages conducted, participant profiles,

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research questions, and our methods for data collection and analysis. Section 4 presents our findings from the application of the World Café technique. Section 5 discusses our results, reflecting on the lessons learned and giving some recommendation for future application of the technique. Lastly, Section 6 concludes the paper, emphasizing the practical implications of our findings, addressing threats to validity, and suggesting directions for future research.

2 BACKGROUND

2.1 Software Development Life Cycles

Software Development Life Cycles are approaches employed by the software industry to design, develop, and validate high-quality software solutions. It involves phases like requirement analysis, system design, coding, integration, testing, deployment, and maintenance, ensuring that the software produced meets customer needs and expectations [23, 26].

Different SDLCs, including the Waterfall and Agile methods, are tailored to address diverse project requirements and contexts. While Agile methods prioritize adaptability and continuous customer feedback, making it suitable for projects with evolving requirements, the structured and sequential nature of the Waterfall Model is best suited for projects with clearly defined and stable requirements [2]. Therefore, it becomes relevant to learn the different techniques and practices of SDLCs to apply the appropriate life cycle for the established context.

In this context, Tenhunen et al. [27] conducted a systematic literature review to identify teaching approaches in SE including the implementation of SDLC models. The authors highlight the necessity for students to navigate through each phase of the SDLCs, from requirements elicitation to software maintenance, fostering a comprehensive understanding and practical competence. They also advocate that engaging students in collaborative techniques fosters a deeper understanding of the software development process, as they emulate real-world scenarios where team collaboration is crucial. Thus, exploring and evaluating collaborative techniques, such as the World Café, can be of help in enhancing the effectiveness of teaching SDLC concepts and practice to students.

2.2 Active and Collaborative Learning in Software Engineering

Active learning “is a student-centric approach that involves students in the learning process and motivates them to take ownership of their own learning experience” [14]. This learning approach has gained attention in both Computer Science and SE disciplines, as it not only enhances the collective understanding of theoretical concepts but also fosters meaningful learning experiences [12, 15].

Observations from the Brazilian Symposium on Computer Education (EDUCOMP)¹ underscore a significant research focus on pedagogical methods. For instance, Martins et al. [18] examined the efficacy of active learning techniques combined with technological tools for teaching Machine Learning at the basic education level; Costa et al. [6] explored the integration of CBL in both undergraduate and postgraduate programs; and, Rodrigues et al. [24] employed

gamification within flipped classroom settings specifically for requirements engineering instruction.

Regarding collaboration, several studies in SEE highlight its critical role in teaching methodologies. In line with recent IEEE and ACM guidelines, Mora et al. [19] emphasize the importance of prepare students with both technical knowledge and essential interpersonal skills such as leadership and communication. Likewise, Garousi et al. [11] point out the growing demand for collaborative skills in the software industry, reinforcing their value in SEE.

In this light, our study seeks to evaluate the potential of the World Café—a profoundly collaborative method—in enhancing active learning for software development life cycles.

2.3 World Café technique

The World Café enhances collaboration by strategically subdividing large groups into smaller subgroups [4]. This technique underscores the importance of intimate interactions, integration of diverse perspectives and the collective knowledge acquisition [10].

World Café fosters collaboration among individuals based on several principles: setting the context and guiding the assembled groups; crafting an environment that fosters trust and collaboration; delving into questions pertinent to real-life situations faced by the group; encouraging participation and connecting diverse viewpoints; collectively contemplating these varied perspectives; and ultimately, sharing collective discoveries. It can enable a group’s collective intelligence to surface and enhance individuals’ capacity for effective action in pursuing shared goals [9, 28].

Figure 1 illustrates how World Café works [28]. It includes:

- **Setting:** The space is set up like a café, with round tables seating 4 to 5 people each. Each table has paper and pens for participants to note down or draw ideas.
- **Questions:** A focused question or topic is chosen for each round of discussion. These questions are designed to stimulate deep thinking and engagement.

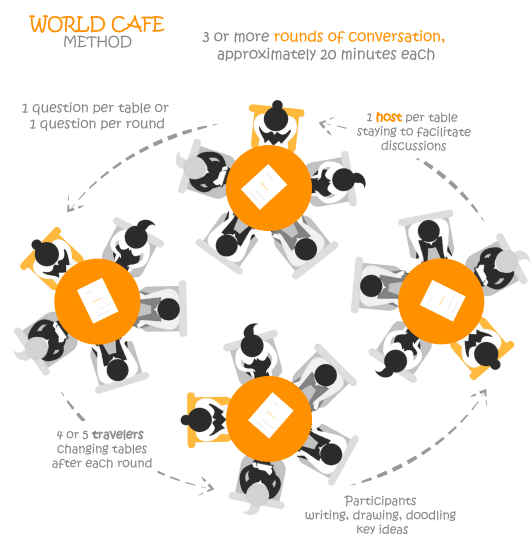


Figure 1: World Café representation given by Urbact [28].

¹<https://www.educompbrasil.org/simposio/>

- **Multiple Rounds of Conversation:** Participants discuss the question/topic at their tables for a set amount of time, typically 20 minutes. After each round, one or more individuals move to a different table.
- **Hosts:** One person stays as the "host" at each table throughout all rounds. The host's role is to welcome new participants and briefly share the insights from the previous discussion.
- **Gathering Insights:** After the rounds of conversation, the key insights and findings are shared with the whole group. This can be done through a plenary discussion, panels, or visual charts.
- **Documentation:** Participants are encouraged to draw, write, and doodle on the table paper to capture ideas. This creates a visual representation of the collective conversation.

Thus, given the inherent collaborative features of the World Café technique, this study delves into its potential as a tool capable of boosting active learning within SEE.

3 RESEARCH METHOD

This paper seeks to explore the main research question: "How does the application of the World Café technique impact students' comprehension and learning within software development life cycles?"

Our investigation employs a mixed-method research approach, integrating both qualitative and quantitative methodologies. We executed the World Café Technique with undergraduate students in the Information Systems program at Federal Institute Farroupilha, Campus São Borja, specifically within the "Fundamentals of Software Engineering" course. This module, consisting of 72 lecture hours in total, unfolds through weekly, 4-hour sessions.

3.1 Stages and Timeline

Figure 2 illustrates our approach to applying the World Café technique. We organized the details across five lanes, each represented by a "W" word: When, Working hours, Who, What, and Where. In this setting, the professor took on the role of a facilitator, guiding the students as they collaboratively and actively deepened their grasp of the subjects at hand.

Our implementation of the World Café was spread over 4 distinct stages: Preparation, Implementation, Rapid Evaluation, and Feedback Collection. We walked through the stages in 4 weeks. Each week consisted of 4 lecture hours, ensuring dedicated attention and deep engagement for every stage. By segmenting the entire process across multiple weeks, we not only fostered thorough comprehension but also enhanced the flexibility of the technique, allowing for real-time modifications based on the continuous feedback and insights we gathered.

Before kicking off the practice of World Café, we conducted a briefing session to introduce the study, the responsibilities and how we would explore collaboration in that scenario.

Stage 1 – Preparation: In Stage 1, we centered on developing presentation slides to introduce definitions, attributes, patterns, and examples of software processes. These materials, focusing on key software process aspects, provided a common knowledge base to support ensuing discussions and activities. We also organized the students in 5 groups and randomly defined a SDLC for each group.

Stage 2 – Implementation of the World Café technique: In Stage 2, both participants (students and facilitator) worked on the practical application of the World Café technique. In rounds, each group presented a script of how they would practice World Café, outlining the flow and the goals. The other participants (attendees) were then organized into groups spread across 4 tables. Each table was equipped with specific materials, such as pens and canvases, facilitating interaction and collaboration among group members. Each group could spend 30 to 40 minutes to conduct the activity, with the facilitator guiding discussions.

Stage 3 – Rapid evaluation: In Stage 3, we focused on consolidating and reflecting on the acquired learning. After each group finished its presentation, we conducted a 2 minutes-long rapid evaluation for sharing insights, discoveries, and conclusions about the SDLC being discussed. The participants could reflect on what they had learned as well as provide an evaluation of the World Café technique's effectiveness in promoting collaborative learning.

Stage 4 – Feedback Collection: In Stage 4, we focused on collecting comprehensive feedback from the participants. We distributed pre-validated online questionnaires to all participants. These questionnaires allowed us to capture a wide spectrum of perspectives based on the participants' experiences.

We conducted the study over 4 weeks. Each week consisted of 4 lecture hours. Next, we show the timeline of our study.

Week 1 - Stage 1 - Preparation: World Café introduction and grouping

Activities: (i) Introduction to the World Café technique by using slides and examples; (ii) Formation of 5 student groups; (iii) Selection of SDLCs for study based on the results of the Systematic Literature Mapping on SE Trends conducted by Cico et al. [5]. We selected the following SDLCs:

- G1 - Kanban
- G2 - Scrum
- G3 - Extreme Programming (XP)
- G4 - Behavior Driven Development (BDD)
- G5 - Test Driven Development (TDD)

Procedure: The facilitator started the class by outlining the activity, detailing the steps and defining the roles of each participant (host vs. attendees). Subsequently, she introduced World Café, highlighting its collaborative characteristics such as its focus on small groups and iterative discussions. Following a 2-hour introductory step, the facilitator randomly assigned the 17 students into 5 groups, according to each SDLC (G1 to G5). To do such assignment, she used the course's virtual learning environment, which features a tool for random group assignment.

Week 2 - Stage 1 - Preparation: Materials and activities

Activities: All groups engaged in (i) using the Desk Research technique [21] for collecting and preparing material; (ii) designing a script to steer the activities; (iii) deploying a Brainstorming to discuss the practical application of the SDLC; (iv) validating the script with the facilitator; (v) preparing materials to explain the SDLC (slides, videos, etc.).

Procedure: In Week 2, students began by researching the World Café technique and the lifecycle assigned to their group. Next, they

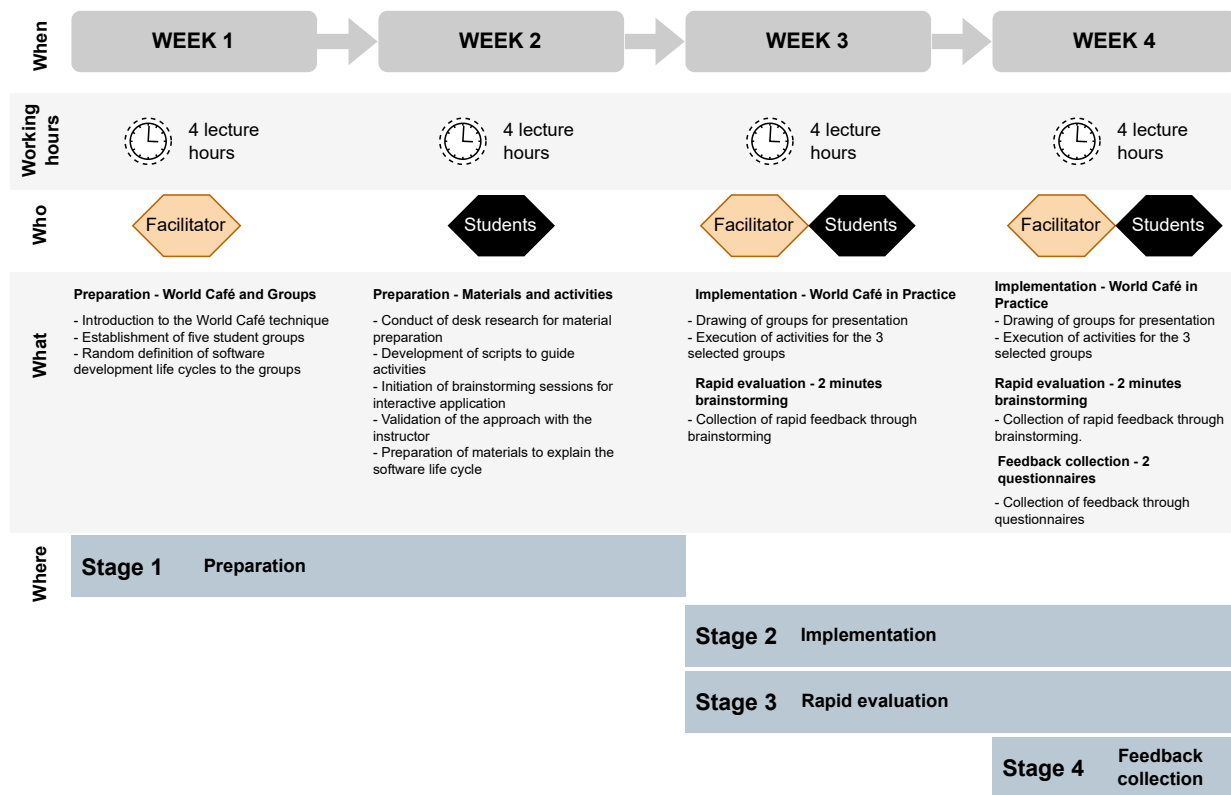


Figure 2: World Café technique’s implementation in 4 stages

spent 2 hours gathering information and preparing the activities based on the practice of the World Café technique. Then, the students designed a script that detailed the activity, outlining roles such as hosts and defining tasks for participants. After that, each group presented their dynamics based on the World Café technique to the facilitator during a half-hour brainstorming session for validation. Finally, they dedicated 1.5 hours to format presentation materials and activities for the subsequent weeks. To preserve the innovative aspect of the activity, the proposed activities were not revealed to other groups.

Week 3 - Stage 2 - Implementation: World Café in practice & Stage 3 - Rapid evaluation: 2 minutes brainstorming – Groups G2, G5 and G3

Summary: In Week 3, we centered around activities from Stages 2 and 3, involving both students and facilitator, as follows: (i) Facilitator - Stage 2: Drawing groups to present that week; (ii) Students from G2, G5 and G3 - Stage 2: Conducting activities for each of the three drawn groups; (iii) Students and Facilitator - Stage 3: Providing rapid feedback for the three groups through brainstorming.

Procedure: The facilitator initiated the class by drawing to determine the presenting groups for the day. The selection included Groups G2 (Scrum), G5 (TDD), and G3 (XP). The facilitator employed a manual drawing method: placing each group’s name on paper slips and having a student randomly select three. Next, the

first group (G2) started their presentation. Each group allocated 10 minutes for a topic presentation, 30 to 40 minutes for executing the activity, and 2 minutes for a rapid brainstorming evaluation of the activities. The feedback addressed questions such as: What points stood out about the presented life cycle? What challenges remain? And, how did the activity proposed by the group members facilitate collaborative learning? The facilitator guided this feedback round.

Figure 3 shows Group 2 applying the World Café technique. The group introduced the Planning Poker method (Item I) for improved planning and estimation, using a backlog box of user stories (Item II) to encourage collective scope and effort discussions and anonymous estimates. They divided participants into 3 subgroups, assigning them to tables (Item III), with three members from G2 hosting each table. Hosts presented a Persona (Item IV) and randomly selected user stories, leading participants through Planning Poker across 3 discussion rounds, executing 3 table rotations in line with the World Café methodology.

Week 4 - Stage 2 - Implementation: World Café in practice, Stage 3 - Rapid evaluation: 2 minutes brainstorming (G4 and G1) & Stage 4 - feedback collection: 2 questionnaires (All groups)

Summary: In Week 4, we focused on activities from Stages 2, 3, and 4, conducted by both students and the facilitator: (i) Facilitator - Stage 2: Define the presentation order of the week; (ii) Students

-Stage 2: Conducted the dynamics of each of the two drawn groups; (iii) Students and Facilitator -Stage 3: Provided rapid feedback for the 2 groups through brainstorming. Finally, (iv) Students - Stage 4: feedback via a questionnaire for all groups.

Procedure: In Week 4, the facilitator started the class by drawing the order of group presentations. G4 and G1 were the 2 first groups to present. After organizing the students and groups, both groups presented and conducted their activities. After 2 hours, G4 and G1 completed their execution of the World Café. Then, the facilitator started a rapid feedback round, similarly to the previous week.

Table 1 displays the Group IDs, the SDLCs, the time slots used for SDLC introductions, the duration of activities, the activities proposed for practicing SDLC tasks via the World Café technique, and highlights in a nutshell the 2-minute feedback from all participants.

Following all presentations, we gathered data on the experience of utilizing the World Café technique for active, collaborative learning on SDLCs. Section 3.4 provides detailed insight into our data collection and analysis.

3.2 Students' Profile and Preparation

Seventeen students from the “Fundamentals of Software Engineering” course, part of the second semester in the Bachelor’s in Information Systems program at Federal Institute Farroupilha - Campus São Borja, participated in this study.

Before initiating study activities, we held preparatory sessions with the students, introducing them to the study’s objectives and SDLCs, marking their first exposure to the topic.

Although the students’ lack of prior experience could introduce a validity risk to the study, considering their roles in preparing materials and presenting new topics, it also offers a notable advantage. The absence of prior biases when evaluating the technique ensures fresh and unbiased feedback.

3.3 Research Questions

To guide our study, we posed 4 auxiliary questions, as follows:

- *RQ1: How does the World Café technique support on students’ understanding of SDLCs?* – Assess the impact of the World Café technique on students’ understanding of SDLCs.

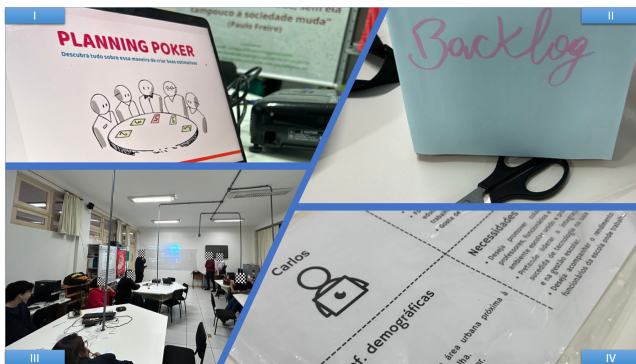


Figure 3: World Café in Practice - Group G2

- *RQ2: How does interaction in small groups during World Café sessions affect students’ perceptions of the technique’s efficacy in learning about SDLCs?* – Explore the advantages and challenges of small-group discussions, a relevant element of the World Café technique, in learning SDLCs.
- *RQ3: What are the students’ suggestions to optimize the use of the World Café technique in teaching SDLCs?* – Collect student insights for refining the World Café technique’s application in future Software Engineering Education.
- *RQ4: How do students perceive the usefulness and ease of use of the World Café technique, and how strong is their intention to use it again, considering the potential impacts of external factors?* – Collect student evaluations of the World Café technique, measuring acceptance, intentions for future use and the impact of external factors, based on the Technology Acceptance Model (TAM) framework [7, 8].

3.4 Feedback Collection and Data Analysis

We collected data regarding the application of the World Café technique through 2 questionnaires²:

- Questionnaire (i): Focused on the technique’s impact on understanding Software Development Life Cycles, perceptions about small group interactions, and suggestions for optimizing the technique. Questionnaire (i) sought answers for RQ1, RQ2, and RQ3. Table 2 shows the Questionnaire (i).
- Questionnaire (ii): Explored perceived usefulness, ease of use, external factors, and future intentions related to using the World Café technique for learning. We employed TAM to address RQ4, inspired in the study conducted by [3], which used TAM to capture students’ perceptions of collaborative learning, social presence, and satisfaction in a blended learning environment, highlighting the relationships and key factors. Table 3 shows the Questionnaire (ii).

We validated the questionnaires with a researcher experienced in active teaching methodologies before sending them to the students during Week 4, as illustrated in Figure 2. We used Google Forms³ to create the questionnaires, and students dedicated 1.5 hours of class time to complete Questionnaires (i) and (ii).

We organized the students’ responses into spreadsheets and utilized Google Sheets⁴ for tabulation and subsequent analysis. We applied statistical analysis to quantitative data and Krippendorff’s Content Analysis to qualitative data [16].

Section 4 presents findings from the data analysis for each defined Research Question.

4 FINDINGS

RQ1: How does the World Café technique support on students’ understanding of SDLCs?

To answer RQ1, we included questions Q1 and Q2 in Questionnaire (i). Q1 captured students’ perceptions of the World Café technique’s efficacy in enhancing their understanding of SDLCs, utilizing a 5-point scale of effectiveness. “Effectiveness” measures the success of a method in achieving its intended outcome. Figure 4

²Questionnaires available at: <https://zenodo.org/doi/10.5281/zenodo.10023563>

³<https://docs.google.com/forms>

⁴<https://docs.google.com/spreadsheets/>

Table 1: Overview of Group Details, Presentation Times, and Quick Feedback

Group	SDLC	Presentation Duration	World Café Duration (total)	Activities Conducted to Explore the SDLC	Highlights for the Group presentation through a 2-minutes feedback round
G2	Scrum	8 min	42 min	Prioritization of user stories in the backlog using planning poker	Opportunity to practice SCRUM concepts Need to manage differing viewpoints during planning poker voting.
G5	TDD	9 min	38 min	Writing small tests for Uber platform features	Understanding the TDD cycle (Red, Green, Refactor) Difficulty in thinking of tests first
G3	XP	7 min	42 min	Simulation of Pair Programming	Understanding of XP values (communication, simplicity, feedback, and courage) Opportunity for discussion about working with different profiles (pair programming)
G4	BDD	10 min	45 min	Writing Scenarios based on the BDD template Given, When, Then	Understanding the potential of collaboration and communication Discussions on creating various GWT scenarios
G1	Kanban	10 min	48 min	Organizing tasks in different workspaces (To Do, Doing, Done) to address a sample case	Discussion on different perspectives for decision-making in prioritizing features in Kanban

Table 2: Questionnaire (i)

Category	Question
RQ1	Q1) On a scale of 1 to 5, how effective do you find the World Café technique in helping you understand software development life cycles? (1 very ineffective - 5 very effective) Q2) Which concepts or aspects of the software development life cycles do you believe you understood better after participating in the World Café sessions?
RQ2	Q3) Did you find the small group discussions during the World Café sessions to be: (1 not beneficial - 5 very beneficial)? Q4) List up to three positive aspects you identified while interacting in small groups during the sessions. Q5) Were there any challenges or difficulties in interacting within small groups? If yes, what were they?
RQ3	Q6) Do you have any specific suggestions to improve the World Café technique in future sessions?

Table 3: Statements for TAM-related Factors

Identifier	Description
Perceived Usefulness	
PU 1	The World Café technique improves the quality of my learning about software development life cycles.
PU 2	I believe that the World Café technique enhances my efficiency in learning about software development life cycles.
PU 3	Using the World Café technique allows me to achieve better academic results.
Perceived Ease of Use	
PEU 1	The World Café technique is clear and understandable.
PEU 2	I believe it's easy to get involved and participate in World Café sessions.
PEU 3	The World Café technique is flexible enough to adapt to different learning needs and styles of students.
Intention of Use	
IU 1	If given the opportunity, I would like to use the World Café technique in other classes or academic contexts.
IU 2	I would recommend the World Café technique to peers or teachers to facilitate learning.
IU 3	In the future, I intend to participate again in activities using the World Café technique.
Impact of External Factors	
EF 1	The way the teacher presented and facilitated the World Café technique positively influenced my experience.
EF 2	Interaction and collaboration with my peers enriched my experience using the World Café technique.
EF 3	The resources and materials provided during the World Café sessions were adequate and useful.

shows that of the 17 students, 14 rated the technique as Extremely Effective (82.35%), and the remaining 3 found it Very Effective (17.64%). None selected moderately effective or below.

Next, in Q2, we asked the students about the topics about SDLC they have learned by the practice of World Café. They pointed out: **a. Overall Comprehensibility:** A respondent felt that a vast majority of the concepts presented during the sessions were easily understandable; **b. Collaboration and Communication:** 12 students highlighted the importance of feedback techniques, collaboration, and communication between teams, and project management; **c. Teamwork Understanding:** 15 participants cited a better understanding of teamwork and the collaborative formulation of shared ideas. They valued the process of addressing requirements, development, and implementation; **d. Active Participation:** 7 feedback emphasized that the sessions were participatory and those

who were engaged benefited significantly. **e. Practical Application:** Students expressed a strong appreciation for the practical application of the concepts. They felt this hands-on approach would be beneficial for their future endeavors. **f. Software Processes:** 13 participant mentioned a clearer comprehension of software processes. **g. Planning and Efficiency:** The importance of software development planning and methods to achieve an efficient development was pointed out. **h. Diverse Techniques from Different SDLCs:** A respondent appreciated learning various techniques and practices from the five life cycles, such as SCRUM practices, XP ceremonies like pair programming, and TDD, particularly mentioning the use of metaphors.

RQ2: How does interaction in small groups during World Café sessions

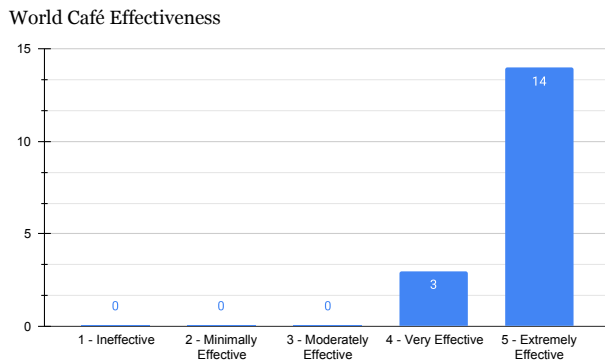


Figure 4: World Café's Effectiveness according to the students

affect students' perceptions of the technique's efficacy in learning about software development life cycles?

To address RQ2, we collected data through 3 questions (Q3, Q4, and Q5) in Questionnaire (i). In Q3, we asked students to indicate on a 5-point Likert satisfaction scale (1 - Very Dissatisfied, 2 - Dissatisfied, 3 - Neither Dissatisfied nor Satisfied, 4 - Satisfied, 5 - Very Satisfied) how satisfied they felt using the World Café and discussing topics in small groups.

Figure 5 shows the results for Q3. The majority of students (13 out of 17 – 76.47%) rated the activity conducted in small groups as very satisfactory. 3 students (17.64%) found it satisfactory, and 1 student (5.88%) gave a neutral evaluation.

In Q4, we asked students to indicate 3 positive aspects regarding the use of the technique in relation to collaboration and interaction in smaller groups. They pointed out the following items: a. Interaction and Collective Construction (8 mentions): Participants emphasized the value of interaction, information exchange, and collective idea building. b. Teamwork and Diverse Ideas (7 mentions): Participants highlighted the importance of teamwork and the richness of diverse ideas in enhancing discussions. Remarks spotlighted team development, diverse ideas, and the benefits of viewing varied

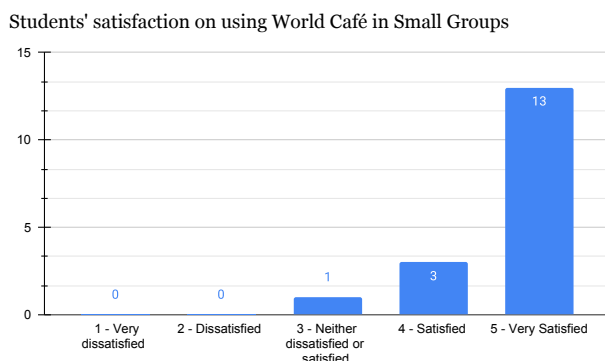


Figure 5: Students' satisfaction on using World Café in small groups

viewpoints; c. Better Understanding and Learning (6 mentions): The group activities enhanced participants' understanding of the subject and fostered a positive learning experience.

In Q5, we asked the students what aspects proved challenging when using the World Café technique. They indicated the following: a. Behavioral Issues (2 mentions): Issues like participants not taking sessions seriously. b. Understanding the activities (2 mentions): A couple of students faced initial confusion about the activities but understood after clarification. c. Time Constraints (3 mentions): Limited time for discussions during the sessions was raised as a concern. d. Need for Printed Materials (1 Mention): There was a suggestion to provide printed materials for a clearer understanding of tasks. e. No Challenges (9 mentions): Most respondents reported no challenges during small group interactions;

Overall, while 8 students pointed out specific areas of improvement, the majority (9 students) did not face with challenges.

RQ3: What are the students' suggestions to optimize the use of the World Café technique in teaching software development life cycles?

To address RQ3, we posed question Q6 in Questionnaire (i): We asked the students if they had suggestions to improve the World Café technique for future sessions. The students responded: a. Time Management (6 mentions): Better time allocation to conduct activities during the sessions was a recurrent issue among all the groups; b. Use of other techniques in combination (4 Mentions): There was suggestions to employing digital tools for note-taking and results documentation and combining techniques like affinity diagram and activity diagram to improve the results of the technique, and c. Feedback and Evaluation (2 mentions): 2 students recommended gathering post-session feedback to refine the technique. Other 5 students considered not necessary changing the way the technique was applied.

RQ4: How do students perceive the usefulness and ease of use of the World Café technique, and how strong is their intention to use it again, considering the potential impacts of external factors?

To address RQ4, we collected data through Questionnaire (ii). Table 3 presents the specific statements inspired by the TAM Model we posed to evaluate student acceptance of the technique. We collected the Perceived Usefulness (PU), Perceived Ease of Use (PEU), Intention of Use (IU), and External Factors (EF) affecting the World Café technique's implementation. Table 3 presents the specific statements for each perception type.

Figure 6 displays results based on the Likert agreement scale (ranging from Totally Disagree to Totally Agree). Students generally found the technique clear and engaging (PEU 1 and PEU 2) regarding Perceived Ease of Use. However, 6 students expressed ambiguity about the flexibility of the World Café to accommodate various learning needs and styles (PEU 3). Thus, the majority of students agree that the World Café technique enhances learning quality (PU 1), improves learning efficiency (PU 2), and fosters better academic outcomes (PU 3) concerning software development life cycles, indicating a positive perception of its Usefulness (PU).

Regarding Intention of Use (IU), Figure 6 shows that although 1 student indicated they were unsure if she would use the World Café technique in other classes or academic contexts and 1 student

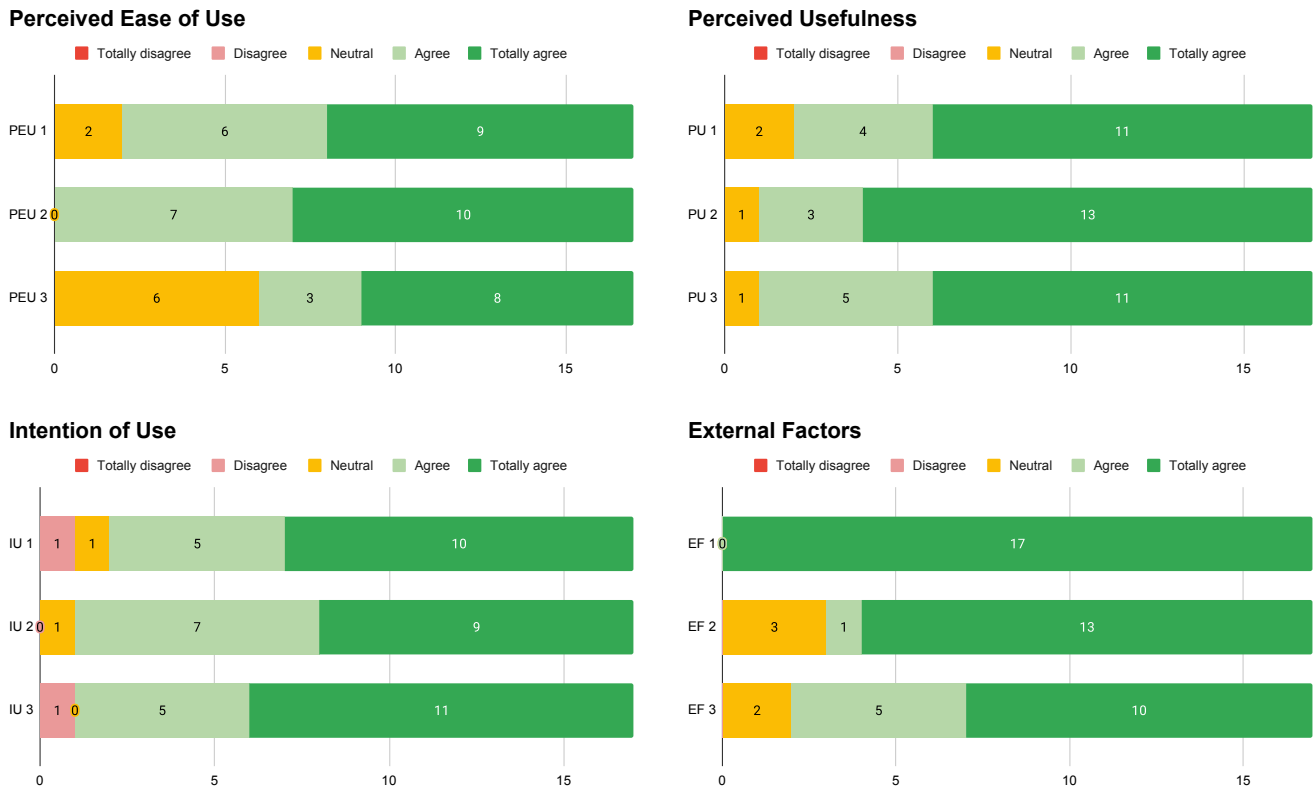


Figure 6: TAM evaluation - Perceived Usefulness, Ease of Use, Intention of Use and Impact of External Factors

indicated she disagreed with using it in other contexts, most students either strongly agree or agree to use it (UI 1 - 15 students). Regarding PU 2, whether the students would recommend the World Café technique to peers or educators to facilitate learning, only 1 indicated a neutral score, while the others marked agree (7) or strongly agree (11). Regarding UI 3, which asks if in the future the student intends to participate again in activities using the World Café technique, only 1 student marked disagree. The others, on the other hand, agree to participate (16 students).

Finally, we pointed out 3 different possible external factors (EF) that could impact the application of the technique. We collected these factors from the technique’s own definition concerning its risk points. Regarding EF 1, the way the teacher presented and facilitated the World Café technique positively influenced my experience, 100% of the students strongly agreed that the teacher acted appropriately as a facilitator. Regarding EF 2, which deals with the interaction and collaboration with my peers enriched my experience using the World Café technique, the results show that 3 students marked as neutral, 1 as agree, and 13 as strongly agree. Regarding EF 3 - The resources and materials provided during the World Café sessions were adequate and useful, there were 2 students who marked neutral, 5 agree, and 10 strongly agree.

5 DISCUSSION, LESSONS LEARNED AND RECOMMENDATIONS

Students appreciated the World Cafe sessions for their interactivity, teamwork emphasis, and practicality, finding them more engaging than traditional classroom instruction.

World Café was positively received among students, with a significant majority rating it as “Extremely Effective” or “Very Effective” for understanding SDLCs. The technique familiarized students with essential SDLC concepts and underscored the importance of real-world application, collaboration, and various SDLC methods. This approach is in line with strategies that promote student engagement in classroom activities, positioning them as active contributors to their learning journey [25].

The participants highly valued interaction, teamwork with diverse ideas, and the improved understanding and learning that group activities offered.

Emphasizing small group interactions is another strength of the World Café approach. A substantial 76.47% of participants found these interactions “very satisfactory.” This aligns with prior research suggesting that active learning focused in groups discussions can enhance comprehension and engagement [17]. Feedback from students further highlighted the value of interaction, communication, and collective idea formation, resonating with studies that champion diverse and collaborative learning environments [14].

Feedback highlighted the importance of refining time management and integrating digital tools to enhance the World Café technique in SEE.

Feedback also pointed towards potential areas of enhancement. Time management emerged as a key theme. Additionally, integrating digital tools and combining the World Café technique with other methodologies, like affinity diagrams, were proposed. Such feedback underscores the dynamic nature of active learning methodologies, where continuous refinement, informed by student feedback, can elevate the learning experience.

Students positively perceived the World Café technique through the TAM Model, highlighting the pivotal role of the educator and suggesting enhancements in collaboration and resource utilization.

Lastly, through the lens of the TAM Model, students' perception of the World Café technique was largely positive, both in terms of its ease of use and its usefulness. External factors, especially the role of the educator, played a crucial role in shaping this perception. The unanimous praise for the teacher's facilitation skills is noteworthy, while feedback on collaboration and resource adequacy offers avenues for further refinement.

5.1 Lessons Learned

Inspired by the multifaceted experiences garnered through the implementation of the World Café technique, we point out a set of lessons learned, as follows:

- **Effectiveness of World Café:** The technique has proven to be exceptionally effective in enhancing students' comprehension of SDLCs, with the majority rating it as "Extremely Effective" or "Very Effective."
- **Holistic Learning:** The World Café approach promotes comprehensive understanding, bridging the gap between theoretical knowledge and real-world application. It offers versatility, covering a wide spectrum of SDLC practices.
- **Small Group Interactions:** Emphasis on smaller group discussions has been pivotal in enhancing comprehension and engagement. The majority of students found these interactions satisfying, highlighting the benefits of interaction, diverse opinions, and teamwork.
- **Feedback and Refinement:** Student feedback is crucial for continuous improvement. Common areas highlighted for refinement include time management, integration of digital tools, and combining the World Café with other techniques for a more holistic learning approach.
- **TAM Model Insights:** The World Café technique is perceived as clear, engaging, and adaptable. While most students found it useful and intend to use it in the future, feedback suggests a need for refining its presentation and structure.
- **Role of External Factors:** The facilitator and the collaborative environment significantly influence the technique's success. Feedback also indicates areas for improvement, ensuring a positive experience.

5.2 Recommendations

In order to enhance the World Café sessions, and considering the feedback received, we suggest the following recommendations:

- **Optimize Time Management:**
 - Allocate appropriate time slots for each session to avoid rushing and ensure thorough discussion.
 - Provide a clear timetable with set milestones for each phase of the discussion to guide groups.
- **Integrate Supplementary Techniques:**
 - Use digital tools for note-taking and documentation.
 - Combine the World Café with methodologies like affinity and activity diagrams to deepen discussions.
- **Incorporate Feedback Mechanisms:**
 - Establish structured post-session feedback mechanisms for insights into effectiveness and improvement areas.
 - Utilize feedback in a cyclical improvement model to refine each iteration of the technique.
- **Ensure Methodological Flexibility:**
 - Adapt the technique to accommodate different focuses, participant dynamics, and topic complexities.
 - Consider various approaches for facilitating discussions and capturing outcomes while maintaining core principles.
- **Leverage Digital Technologies:**
 - Integrate digital platforms to enhance collaborative and interactive elements.
 - Utilize online platforms for documentation, sharing, and reviewing insights, enhancing post-session engagement.
- **Maintain Participant Engagement:**
 - Engage participants with periodic check-ins and motivational cues.
 - Provide incentives or recognition for active participation and meaningful contributions.
- **Facilitate Effective Transition Between Sessions:**
 - Ensure smooth transitions between tables or themes with clear instructions and sufficient transition time.
 - Use facilitators to guide transitions and ensure key insights transfer to subsequent discussions.
- **Enhance Resource Adequacy:**
 - Ensure all necessary materials, resources, and technical support are available and accessible.
 - Plan for contingencies to manage potential resource-related challenges during sessions.

6 FINAL CONSIDERATIONS

In this study, we examined the efficacy of the World Café technique on students' learning of SDLCs. Implementing both qualitative and quantitative research approaches, we integrated the World Café Technique into a SE course. The technique was structured over 4 distinct stages, spanning multiple weeks to promote in-depth engagement and adaptability based on feedback. Our method involved preparation, implementation, rapid evaluation, and comprehensive feedback collection. Through different data collection instruments, we found that the students positively received the technique, highlighting its effectiveness for collaborative learning of SDLCs.

6.1 Threats to Validity

Inherently to a qualitative study in Software Engineering, our study presents the following potential threats to validity:

- **Internal Validity:** Some students dropped out of participation in the study. To mitigate this risk, we organized different groups, each always containing at least 3 students.
- **External Validity:** There's a risk of Population Validity (Sampling), suggesting that results might not generalize beyond the studied sample. To address this risk, we invited students with various profiles.
- **Construct Validity:** It relates to the accuracy of the measurement tools and methods. To avoid this risk, we evaluated our study and the data collection instruments with another researcher in active teaching methodologies.
- **Conclusion Validity:** It pertains to the relationship between the treatment and the outcome. Data was analyzed by more than one paper author in an attempt to reduce risks regarding the results.

6.2 Practical Implication of the Finding

This study sheds lights on the use of World Café as a technique to fostering collaborative learning based on small groups discussions. In addition, our experience report has the following practical implications: (i) For students, the World Café technique shows the importance of engaging in interactive and collective learning methodologies, thereby motivating an active pursuit and involvement in such instructional strategies. (ii) Educators may derive valuable knowledge regarding the utility of this technique, contemplating its incorporation into curricula to deepen understanding and stimulate engagement.

6.3 Future Work

In future work, we aim to explore the application of the World Café technique with students of varying knowledge levels and across different content areas in software development. Additionally, we intend to implement improvements suggested by the students based on the experiences shared in this study. Another avenue of future research we are considering involves employing the technique in the field of requirements engineering, given its potential to aid in the elicitation of high-quality requirements. Furthermore, we plan to develop a collaborative software tool that facilitates the practice of the World Café method with computer assistance.

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