

"Can you feel the vibes?": An exploration of novice programmer engagement with vibe coding

Kiev Gama
Universidade Federal de Pernambuco
Recife, Brazil
kiev@cin.ufpe.br

Filipe Calegario
Universidade Federal de Pernambuco
Recife, Brazil
fcac@cin.ufpe.br

Victoria Jackson
University of Southampton
Southampton, United Kingdom
v.jackson@soton.ac.uk

Alexander Nolte
Eindhoven University of Technology,
The Netherlands
Carnegie Mellon University, USA
a.u.nolte@tue.nl

Luiz Augusto Moraes
Universidade Federal de Pernambuco
Recife, Brazil
gusto@cin.ufpe.br

Vinicius Garcia
Universidade Federal de Pernambuco
Recife, Brazil
vcg@cin.ufpe.br

Abstract

Emerging alongside generative AI and the broader trend of AI-assisted coding, the term “vibe coding” refers to creating software via natural language prompts rather than direct code authorship. This approach promises to democratize software development, but its educational implications remain underexplored. This paper reports on a one-day educational hackathon at a Brazilian public university – Universidade Federal de Pernambuco (UFPE) – with undergraduate participants from computing and non-computing disciplines. Through observations, an exit survey, and semi-structured interviews, we examined creative processes, tool usage, collaboration dynamics, and learning. Findings reveal that vibe coding enabled rapid prototyping and collaboration, with participants developing prompt engineering skills and delivering functional demonstrations. However, we also observed premature convergence in ideation, uneven code quality requiring rework, and limited engagement with core software engineering practices. Teams combined multiple AI tools, with human judgment remaining essential for refinement. The short format (9 hours) proved effective for confidence-building among newcomers while accommodating participants with limited availability. We conclude that vibe coding hackathons can serve as valuable low-stakes learning environments when coupled with explicit scaffolds for divergent thinking, critical evaluation of AI outputs, and realistic expectations about production quality.

CCS Concepts

• Applied computing → Interactive learning environments.

Keywords

Software Engineering Education, Hackathons, Vibe Coding, Generative AI

ACM Reference Format:

Kiev Gama, Filipe Calegario, Victoria Jackson, Alexander Nolte, Luiz Augusto Moraes, and Vinicius Garcia. 2026. "Can you feel the vibes?": An exploration of novice programmer engagement with vibe coding. In *2026 IEEE/ACM 48th International Conference on Software Engineering (ICSE-SEET '26)*, April 12–18, 2026, Rio de Janeiro, Brazil. ACM, New York, NY, USA, 12 pages. <https://doi.org/10.1145/3786580.3786992>

1 Introduction

Software is a part of everyday life, from critical infrastructure and finance to health, mobility, and communication. Understanding how it functions and being able to contribute to its creation can therefore be perceived as a form of civic participation [41]. Starting to learn about software is difficult, though, as it requires specialized knowledge that novices must acquire before being able to produce non-trivial artifacts [42]. This expertise, in turn, is typically obtained through sustained education over longer periods of time, e.g., in the form of university curricula. Sustained education, however, is not always feasible, particularly for individuals with limited time due to other commitments such as work and caregiving [22].

The recent emergence of Generative AI (GenAI) in general and vibe coding in particular might help lower this barrier [4]. It allows basically anyone with access to suitable tools to create polished prototypes by describing what they want to build and iteratively refining what the tool produces [43]. It is, however, unclear at this point if people learn about technology while vibe coding. What is clear, though, is that novices will unlikely benefit from vibe coding alone. Pedagogy has long established that learning in a social environment and suitable support greatly benefit learning [13].

Hackathons can be a suitable setting in this context. They are time-bounded events during which participants form teams to collaboratively develop an artifact, which often takes the form of a piece of software [11]. During hackathons, participants typically receive support in the form of mentors [30]. Prior research has shown the suitability of hackathons for educational purposes in formal [36] and informal [28] settings. Hackathons have, however, also been criticized as scary for newcomers because of the assumption that technical proficiency is a requirement for attendance [17, 54].

It thus appears that running a vibe coding oriented hackathon can be mutually beneficial. Hackathons can provide a social environment where participants can try out and learn about technology



while receiving support when needed and vibe coding can lower the barrier for attendance because it can lower the perception of technical proficiency being a prerequisite for attendance.

In this paper, we report on an experience-based study of a one-day vibe coding hackathon. Our goal was to understand how novices and mixed-experience teams utilize GenAI to transition from ideas to functional prototypes, what they learn in the process, and which event design choices facilitate participation.

2 Background and Related Work

In this section, we will introduce the concept of vibe coding before discussing how GenAI and hackathons have been utilized in the context of software engineering (SE) education.

2.1 Vibe Coding

Advances in AI, coupled with the natural language interfaces of tools, such as Claude [8], Replit [40], Cursor [10], and others, have led to the emergence of a new programming paradigm, colloquially known as “vibe coding”. First coined by Andrej Karpathy in February 2025, “vibe coding” is to “fully give in to the vibes, embrace exponentials, and forget that the code even exists” [4]. Popularly, vibe coding has been interpreted as developing software solely by prompting an AI without modifying the code it produces [25, 31, 43].

Vibe coding has garnered significant attention within (e.g., [25, 45]) and outside (e.g., [43, 49, 50]) the SE community, with some noting that it can democratize the development of new applications, as they can be developed without coding experience [43]. Indeed, some consider vibe coding as a new development paradigm where humans and GenAI co-create software by conversing in natural language rather than code [27] or an evolution of first-generation AI-assisted programming [44], which started with the availability of tools such as Copilot. Benefits of orchestrating and prompting AI-based tools include a lower barrier to entry for application development [27], reduced time to market [27], productivity benefits [25], and greater autonomy for engineers [25]. Yet, risks have also been identified, including the potential for developers’ technical skills to degrade [27], reduced code quality leading to issues such as security flaws [55], and ambiguous authorship and accountability [27]. Developers have also reported that vibe coding can support rapid functional prototyping, especially when requirements are still evolving [6].

Despite the hype surrounding vibe coding, empirical research into this emerging phenomenon is scarce. One study [18], with CS and SE students of differing coding experience, found that inexperienced students interacted via prompts more than advanced students, who noticeably reviewed and amended code more frequently. Also, the prompting styles varied with inexperienced students authoring vague prompts compared to advanced students, who wrote more specific and code-focused prompts.

A study [44] of vibe coding live-streams notes that professional developers use an ecosystem of AI tools, and the objectives and requirements for the application evolve through developers’ interactions with the AI tools. Challenges faced include difficulties in communicating abstract ideas and understanding the capabilities and limitations of the AI tools. The study finds that technical expertise is beneficial in several ways, including identifying problems

with the code, keeping the solution aligned with goals, and selecting the appropriate tools and technologies.

Finally, a study examining social media posts about vibe coding and data from interviews of vibe coders [35] characterizes vibe coding as co-creation between AI and humans. The paper also discusses challenges of vibe coders (incorrect solutions provided by AI and poor-quality code) as well as best practices (including breaking up large tasks and rubber-ducking).

By setting our experience report in a different context, we are able to contribute an initial understanding of the impacts of vibe coding in a context important to SE education. Namely, a time-bound educational hackathon open to all students irrespective of technical expertise and degree studied. In such a setting, we can extend the above findings to include the perspectives of novice developers and contribute findings pertinent to hackathons.

2.2 GenAI in SE Education

With the rapid adoption of GenAI tools by software professionals [46], computer science educators are integrating GenAI into higher education curricula [37] to ensure that students acquire AI literacy and skills to thrive as professionals. GenAI tools have been incorporated into classes on programming (e.g., [23, 24, 38, 39]), testing [53], and software design [7].

Integrating GenAI in classes offers benefits to students such as accelerating task progress [39] and increasing their self-efficacy [57]. However, educators have also highlighted drawbacks of using GenAI, including an over-reliance when programming [38], a decline of meta-cognitive abilities [39], and eroding social interactions with peers [20]. Despite these challenges, GenAI has become a core component of modern software development, and it is useful for students to understand how to interact with GenAI tools [23] and explore capabilities, but also think about risks such bias [21] and ethical and legal [3] concerns. Exactly how to provide such learning is a challenge for educators [34]. One such approach, as described in this paper, is to run a hackathon, a popular approach for complementing traditional classroom learning [15].

2.3 Hackathons and SE Education

Hackathons are time-bounded events during which participants form teams and collaboratively work on a project that is of interest to them [11]. The outcome of the project commonly takes the form of a software prototype. Hackathons have been adopted in various domains including science [30], industry [33], entrepreneurship [29], civic engagement [58], and others. One popular form are educational hackathons. These can come in the form of informal learning spaces [28] or they can be integrated into formal learning complementing what occurs in classrooms [36, 56]. Hackathons can provide an excellent learning environment (i.e., solving problems in realistic contexts that ensure relevance) [19]. The adoption of hackathons in education has been steadily expanding [12] and they are included in courses across various disciplines (e.g., software engineering [36], security [2], IoT [15]).

The short duration of hackathons can constrain the exploration of software engineering practices (e.g., design, testing) [14, 48]. Nevertheless, there have been attempts to include SE practices, such as code reviews [9, 32] and there is indications towards the usefulness

of hackathons in higher education [47] and that events can provide learning opportunities for newcomers to specific domains [30].

Although research on educational hackathons has highlighted their potential, several challenges to their inclusivity remain. One major issue is the lack of diversity, with events often attracting skilled developers, which can be intimidating for novices [17]. While organizers have experimented with making events “beginner-friendly” by providing mentor support [30], these interventions often steer novices away from core development tasks [51]. Compounding this issue, the significant time commitment of multi-day events excludes participants with personal or professional obligations, intensifies pressure, and has the potential for fatigue [15]. Therefore, designing shorter, more focused events emerges as a key strategy to foster accessibility. The 8-hour format of the hackathon we organized, as described below, was a deliberate choice to create a space where participants with limited availability could meaningfully engage with software development.

3 Setting

The vibe coding hackathon was conceived as an in-person and inclusive event designed to welcome early-stage undergraduate students with diverse backgrounds (Computer Science, Cinema, Engineering, Design, etc) and levels of experience in programming, ranging from beginners to advanced programmers. The main event goal was to foster a collaborative environment where learning and enjoyment were as important as technical outcomes. To encourage this spirit, teams were organized into two categories: those composed exclusively of undergraduate students from computing programs (Computer Science, Computer Engineering, Information Systems, and Artificial Intelligence), and mixed teams integrating participants from both within and outside the computer science domain. This structure enabled cross-disciplinary collaboration while also acknowledging the value of peer exchange among students at various stages of their learning journey.

The event was held in July 2025 at Universidade Federal de Pernambuco (UFPE), a Brazilian public university, and received financial support from two companies: a multinational that specializes in building information systems and a local software house.

3.1 Key Event Design Decisions

To facilitate replication, we structure this section along the Hackathon Planning Kit [1], which served as a guide for organizing this event:

- (1) **Goal:** The hackathon’s goal was to practice “vibe coding” while fostering an inclusive, collaborative learning environment open to beginners and experienced students across disciplines. It aimed to spark creativity, form small teams, and connect participants with industry sponsors.
- (2) **Theme:** The organizers developed a “theme generator app” to create challenges (e.g., how to make learning more inclusive for Black people, considering floods). The app worked as an example of vibe coding and also supported teams in generating a theme/problem for their project.
- (3) **Competition vs. Cooperation:** A cooperative atmosphere was fostered under a light competitive layer to recognize standout work without discouraging novices. The panel of judges consisted of three people from industry, two of them

with experience in vibe coding. Two projects were awarded for technical quality, innovation, and social relevance. Winners of each category received 3D-printed trophies.

- (4) **Stakeholder Involvement:** The topic was broad and no specific stakeholder was in mind. One of the sponsoring companies uses vibe coding to demonstrate concepts in some of their projects. Two people from their personnel were in the event and had brief discussions with some of the teams.
- (5) **Participant Recruitment:** The hackathon was announced by the Informatics Department press office through its social networks. The online registration form was closed one week after the announcement, when it surpassed 100 registrations. Due to physical space limitations of the room, 50 participants were selected but only 31 showed up.
- (6) **Specialized Preparation:** During the general instructions there was a quick contextualization about vibe coding and some tools. The theme generator app was also presented as an example of vibe coding. The prompt is available online [16].
- (7) **Duration & Breaks:** Since vibe coding generates executable results faster, we chose a one-day hackathon format (approximately 9 hours). Just one break was scheduled, with coffee, refreshments and snacks sponsored by a local IT company.
- (8) **Ideation:** Participants had one hour to submit a project idea that would be vibe coded afterwards. Their ideation was supported by the theme generator app. They were also free to use LLMs for support.
- (9) **Team Formation:** Teams consisted of 3 or 4 individuals (including programmers and non-programmers). Team could be formed prior to the event. The schedule included dedicated time for team formation and onboarding.
- (10) **Agenda:**
 - 08:30 – Registration
 - 09:00 – General instructions and challenge briefing
 - 09:45 – Team formation (for those without teams)
 - 10:00 – Ideation begins
 - 11:00 – Submit project idea and start development
 - 13:00 – Quick Snack/Coffee Break
 - 16:00 – Pitches begin (final presentations)
 - 17:30 – Awards and Closing
- (11) **Mentoring:** The mentoring team consisted of three students and three teachers. Guidance was mainly about overall instructions, checkpoints and event clarifications. During the hackathon, participants demanded no technical support.
- (12) **Continuity Planning:** None.

3.2 Winning Projects

Among the projects presented, two were chosen as winners because of their technical quality, innovative approach, and social relevance. In the mixed-team category, the winning project was a gamified web platform to promote inclusion and accessibility in recruitment processes for neurodivergent individuals. It uses AI to adapt the selection journey to the user’s profile, considering, e.g., candidates with Attention Deficit Hyperactivity Disorder (ADHD). Traditional

Table 1: Interviewees profile

ID	Gender	Bachelor	Team	Team Category
P01	M	Info. Systems	Team 1	Tech-only
P02	M	Info. Systems	Team 1	Tech-only
P03	M	Info. Systems	Team 2	Cross-disciplinary
P04	M	Comp. Science	Team 3	Tech-only
P05	F	Comp. Science	Team 4	Cross-disciplinary
P06	F	Info. Systems	Team 2	Cross-disciplinary
P07	F	Design	Team 2	Cross-disciplinary
P08	M	Comp. Eng.	Team 5	Tech-only
P09	M	Film/Cinema	Team 6	Cross-disciplinary
P10	F	Lang. & Literature	Team 6	Cross-disciplinary

assessment stages were designed as short missions with accessible design, simplified text, audio resources, and adjustable pacing, aiming to reduce cognitive overload and enhance engagement.

In the category restricted to CS-related students, the winning project was IRIS Map, an interactive web platform focused on fostering safety, visibility, and community support for LGBTQIAP+ individuals. It uses maps to highlight safe spaces, businesses led by community members or allies, and inclusive events. By strengthening support networks and making diversity more visible, the initiative seeks to contribute to building more inclusive and respectful environments.

4 Method

To study the participants' experience of Vibe Hack, we conducted three research activities. The first was observations of teams during the event, the second was an (optional) exit survey completed by participants at the end of the Vibe Hack, and the third were interviews. Having three different perspectives on the experience enabled us to gain richer insights. All data collection instruments are available on FigShare [16].

4.1 Observations During the Hackathon

We conducted observations throughout the hackathon. Three teachers served as observers and held brief discussions during the event to align focus and compare impressions. One observer adopted a roaming role, circulating among teams, staying several minutes with each to watch interactions, and recording field notes. The observers periodically shared their observations to clarify interpretations and consolidate salient episodes.

4.2 Exit Survey

An optional exit survey was prepared to gather feedback from participants about their experience of the hackathon.

4.2.1 Survey Instrument. Specific focus areas within the instrument were on the teams' creative process including their usage of GenAI, quality of the final solution, incorporation of architecture considerations into the design, and overall learnings from the experience. Originally, a goal of the survey was to analyze students software engineering self-efficacy framed by Bloom's taxonomy [26].

Table 2: Areas covered by exit survey questions

Area	Num. Questions	
Motivation /Experience	14	Studied subject, programming experience, familiarity with GenAI tools, hackathon exp., motivations for attending
Creative Process	13	Use of AI for ideating, interaction with AI, description of creative process
Team Process	6	Roles on team, collaboration effectiveness and engagement
Quality	5	Quality of AI responses and final solution
Architecture	7	Architecture self-efficacy based on Bloom's taxonomy
Learnings	5	specific skills learned, intended use of AI going forward for developing applications
Feedback	1	Feedback on Vibe Hack

On reflection, inserting such questions would have led to a long survey, introducing the risk of low completion rates. As it was decided more important to increase the survey completion rate than explore self-efficacy, the majority of the SE self-efficacy questions were cut from the survey, with the exception of the architecture questions. The survey consisted of 50 questions with the majority (44) being mandatory, closed-ended Likert scale questions (31) and only 6 optional, open-ended questions. Table 2 summarizes the questions in each focus area. The full questionnaire is available [16].

Several of these questions probed whether teams generated original or varied ideas, how frequently they revisited or abandoned them, and whether GenAI influenced iteration. Open-ended items further captured participants' descriptions of their ideation stages, allowing us to examine convergence or divergence.

The survey was conducted in Portuguese and was accessible anonymously to the hackathon participants via Google Forms. No personal identifiable information was collected. The survey first described the purpose of the research before asking for informed consent to participate. Participants were invited to complete the survey at the end of the hackathon. Of the 31 participants, 27 completed the exit survey.

4.2.2 Data Analysis. The survey responses were captured automatically into a Google Sheet and subsequently translated into English using Google Translate. A bi-lingual researcher fluent in Portuguese and English corrected translation errors; minor edits were applied for clarity while preserving the original meaning. In addition to quantitative summaries, we occasionally report anonymized verbatim excerpts from the survey's open-ended fields to findings.

Next, the data was analyzed within Google Sheets. Basic counting was performed on the responses as presented in subsection 5.2.

4.2.3 Survey Respondents' Experience. The respondents' prior experiences of hackathons, GenAI, coding, and software architecture are summarized below:

- **Hackathon experience:** For 20 respondents, this was their first hackathon. 4 had attended one, 1 had attended two, and 2 had attended more than three events.

- **GenAI familiarity:** The majority (23) of the respondents were familiar with GenAI with 9 reporting moderate and 14 high familiarity levels. Only 4 had little familiarity.
- **Coding experience:** Most (19) rated their coding experience as comparable (12) or more experienced (4) compared to their peers. 3 felt very inexperienced and 8 felt inexperienced.
- **Knowledge of software architecture:** Respondents generally reported low levels of knowledge (20) with 2 having never heard of it, 11 having heard about it but no technical knowledge, and 7 claiming basic knowledge. 6 claimed intermediate and 1 advanced knowledge.

In terms of disciplinary background, the respondent pool was predominantly from computing-related programs (Information Systems, Computer Science, Computer Engineering). Four respondents came from non-computing majors (e.g., Biomedicine, Design, Film/Cinema, and Languages & Literature). While in the minority, these individuals offered distinct perspectives during ideation and teamwork, which we elaborate on in Section 5.2.

4.3 Interviews

To probe further into individual experiences we also conducted interviews. We purposefully sought diversity in experiences by selecting participants who differed in terms of their gender, degree subject, and team category (tech-only or cross-disciplinary). We recruited ten participants (Table 1) from five different teams. Six identified as men, four as women. Three studied non-technical subjects, such as Design. Six came from cross-disciplinary teams.

Interviews were conducted by three researchers. They were conducted in Portuguese and remotely via Google Meet the week after the event while experiences were still salient. We used a semi-structured format following an interview protocol [16]. The interview covered the usage of generative AI in creative and technical software tasks: prior exposure, idea generation, how AI was used (tools, prompts, leadership), perceived usefulness and reliability, and technical understanding. It also inquired about challenges, team dynamics, personal reflections, learning, future use, and concluded with an open-ended question.

4.3.1 Data Analysis. Audio recordings were transcribed in Portuguese using an automatic speech recognition service based on OpenAI Whisper version 3. Transcripts were anonymized by replacing participant names with identifiers P01 to P10. One researcher then reviewed the transcripts to correct recognition errors, with particular attention to nouns and tool names that were frequently mistranscribed, such as Lovable, ChatGPT, and Claude.

Analytic coding proceeded in two stages. First, two researchers divided the transcripts, with each researcher taking a separate portion, and selected relevant excerpts from their assigned sections. They attached open, inductively generated codes to each excerpt, and there were no intersections of quotes evaluated by both. This process produced a dataset of 294 quotes, each paired with its associated code comments. Second, the table containing quotes and codes was provided to ChatGPT running GPT-5 Thinking to assist with code organization. The prompt was enhanced using the OpenAI GPT-5 Prompt Optimizer¹ and can be found in the

¹<https://platform.openai.com/chat/edit?models=gpt-5&optimize=true>

Supplementary Material [16]. This model-assisted approach was chosen both to enhance the efficiency of synthesizing the codes and to serve as a check against researcher bias. The prompt required clustering of the existing code comments and mandated that each proposed cluster be explicitly supported by related quotes.

The use of LLMs in qualitative research in Software Engineering is discussed and encouraged to automate and streamline certain phases of research, but the decision-making should remain as an essential part of human participation [5, 52]. In this experience report, relevant quotes were selected by two researchers, with the assistance of LLM tools. We recognize that LLMs cannot replace human interpretive judgment in qualitative analysis. Therefore, all clustering outputs were treated as suggestions rather than findings.

The complete analysis, including automated clustering, was subjected to human verification by a researcher who examined the coherence of clusters, checked quote assignments, and confirmed that no hallucinated content or incorrect groupings had been introduced. Model-assisted steps were therefore used as an aid, with final decisions grounded in the researchers' review of the original language quotes and corresponding translations.

4.4 Ethics and Data Availability

The study was approved by the IRB of the hosting institution under the number CAAE 89668425.2.0000.5208. Informed consent was received from all study participants. No monetary or other incentives were provided for participation. The IRB required that only excerpts would be used to report the findings.

5 Results

We first present the results from observations, followed by exit survey results, and findings from the interviews.

5.1 Observations

Our analysis of teams using vibe coding revealed distinct patterns in collaboration, tool adoption, and encountered challenges.

Teams with mixed backgrounds tended to combine brainstorming, exploratory prototyping, and iterative refinement, often using tools such as ChatGPT, Gemini, and Lovable to generate ideas, validate directions, and create interactive front-ends. **Computer science-only teams, in contrast, relied on generated code as a starting point,** which they then refined by manually fixing bugs and enhancing functionality; in some cases, they also utilized generative AI to produce user interface elements, such as app icons.

Across groups, vibe coding was used to accelerate development through tools like Copilot, VSCode integrations, and Lovable. However, participants highlighted recurring obstacles, including limited credits to test prompts, difficulties in connecting tools, and the challenge of manually editing or scaling prompts. Vibe coding practices enabled rapid prototyping and cross-disciplinary collaboration. However, tool fragmentation and resource constraints were limitations, shaping both the pace and direction of projects.

We also noticed that **vibe-coded web applications had very similar user interfaces.** This also happened with the theme generator app. Two teachers utilized distinct tools (Replit and Lovable) to

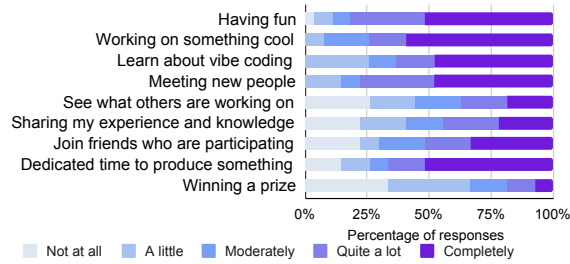


Figure 1: Respondents' motivations for attending

generate two similar apps, but with different prompts that targeted the same objective.

5.2 Survey

This section presents the survey results with each section corresponding to the different question groupings in the survey.

5.2.1 Motivation/Experience. Our respondents mainly participated for **social reasons** with having fun, working on something cool, meeting new people, and joining friends who are participating all rated as positive motivations for attending (see Figure 1). **Learning** in an environment where they had “Dedicated time to produce something” were both important motivating factors also, with nearly half “Completely” agreeing that “learning about vibe coding” was a motivation for participating. **Winning a prize was the least important motivation.** These motivations re-enforce the view [36] that hackathons are fun, social events providing an opportunity to learn new technologies. Beyond the Likert-scale items, open-ended responses also suggest a **confidence-building** role for the event among first-timers. One respondent explicitly framed the hackathon as a gentle on-ramp: “*I want to start participating in these events, but I’m new to this world [...] I hope to gain confidence to go to other kinds of hackathons*”. While only one out of the four “other motivations” entries mentioned confidence explicitly (out of 27 total respondents), the comment points to a perceived reduction in the barrier to entry for novices.

Taken together with the predominantly social/learning motivations in Figure 1, this suggests that short, inclusive, time-bounded formats can help build confidence for newcomers and can thus be complementary to traditional coursework.

It is worth noting that disciplinary diversity was limited: only four out of 27 respondents came from non-computing programs. Yet, even in this small group, we observed contributions that broadened the project’s framing. For example, survey and interview data indicate that design students made decisions about user experience, while audiovisual and biomedicine students contributed to narrative framing and accessibility considerations. Although not sufficient to claim representativeness, these accounts illustrate how **cross-disciplinary presence can enrich vibe coding teams.**

5.2.2 Creative Process. At the start of the hackathon, each team needed to define a problem they wished to solve, identify and explore different ideas, and to select one to be developed further, preferably into working code. As the teams were “vibe coding”, we

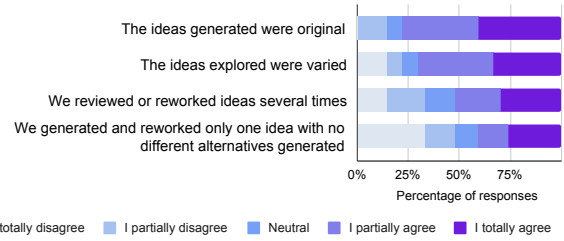


Figure 2: Exploring ideas with GenAI

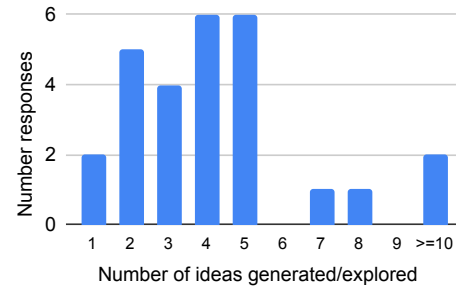


Figure 3: Number of ideas generated

were curious to understand their creative process and the involvement of AI tools. Firstly, as shown in Figure 3, **the number of ideas considered and explored was five or fewer** (23/27 respondents). This is perhaps not surprising given the time-bound nature of the event and the focus on delivering working code. In contrast, two respondents noted their team explored more than 10 ideas, with one team generating 15 ideas.

Secondly, about the use of GenAI in the ideation process (Figure 2), over 75% of the respondents partially or totally agreed that the ideas generated were original, with slightly fewer (70%) feeling that the ideas explored were varied. These responses demonstrate a broad, **optimistic view of GenAI’s ability to assist with ideation.** Yet, there was evidence that **ideas were little reviewed or revised**, with just over half of the respondents partially or totally agreeing that ideas were reviewed or revised, and 40% partially or totally agreeing that they only generated and revised a single idea.

Finally, in terms of guiding the creative process, **all teams used AI to assist, yet humans were predominantly the driving force.** Ten respondents noted that humans were driving, with some help from AI, 9 felt it was balanced between AI and humans, and 5 felt it was mostly humans with little help from AI. In contrast, only 3 answers said that AI contributed a lot with little human involvement.

5.2.3 Team Process. The majority of respondents were **very positive about the effectiveness of their team’s collaboration** and individuals’ engagement in the activity (Figure 4). More than 75% of respondents felt collaboration between team members was effective (partially or totally agree) and that all team members collaborated

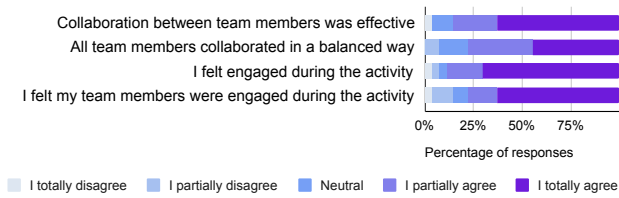


Figure 4: Team collaboration effectiveness

evenly. Moreover, nearly 90% felt engaged during the activity, and more than 75% felt their team members were also engaged.

To work effectively, the individuals in the teams needed to self-organize with **some teams deciding to allocate specific roles** to individuals. Only 11 respondents noted their team had a designated leader. Alongside this leader role, 14 respondents indicated there was a lead programmer on their team, 12 indicated a designer role was present, while 9 indicated less role formality in their team.

In terms of **who in the team interacted with the GenAI tools**, there are two distinct interaction patterns. In the first, there is a single GenAI instance with either the whole team sharing it (3 respondents) or one person in the team interacting with it (2 responses). In the second, multiple GenAI instances were used, with 7 respondents noting all team members used their own instances and 15 indicating they used multiple instances to compare responses.

For the majority of respondents (16), their **interactions with the AI tools** were continuous during the hackathon. Three respondents noted it was mostly used at the beginning, 6 indicated it was mostly used in the middle, and 2 felt there was no clear pattern.

Finally, a significant proportion of respondents (66%) felt that **using AI in the hackathon had freed up time**.

5.2.4 Quality. Figure 5 shows respondents' perspectives on the quality of the AI responses including the amount of rework required. Trust in the answers was nearly equal between those who partially or strongly agreed to trusting the AI answers (45%) and the remaining 55% being neutral or partially disagreeing. Slightly fewer respondents believed the code was of good quality and maintainable (40% partially or strongly agreed). There were stronger views on whether rework or additional prompts were required with just over 25% of respondents strongly disagreeing with the statement that they used the responses without rework or additional prompts and 5% strongly agreeing with the statement. Overall, the responses highlighted a **general lack of trust in the quality in the code, leading to rework** either by amending the code or issuing further prompts.

Considering the quality of their resulting application, only three respondents thought it had no bugs, while two thought it had severe bugs. The majority (22) noted it had some issues with 12 believing it had a small number, and 10 noting a moderate number.

Overall, the majority of respondents (19) felt **their resulting application was functional** with 18 stating it was mostly functional and 1 considering it was completely functional. In contrast, 2 thought it was not functional and 6 finding it partially functional.

These findings show that despite the short-time frame of the vibe hack, and additional rework required in terms of modifying code or

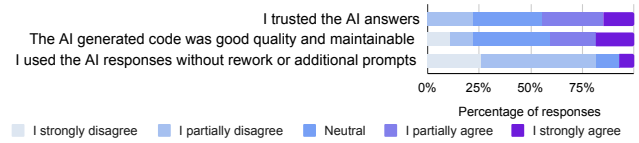


Figure 5: Quality of AI responses

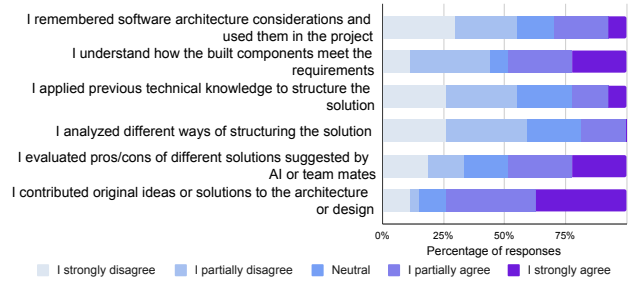


Figure 6: Architectural considerations

revising prompts, nearly all teams were able to build a functional prototype albeit containing some bugs.

5.2.5 Software Architecture. Despite respondents reporting little knowledge of software architecture (subsection 4.2.3), there was some **evidence of architecture practices** being used (see Figure 6). On the one hand, while nearly 75% of respondents partially or fully agreed with the statement that they contributed original ideas or solutions to the architecture or design, fewer than 25% of respondents partially or strongly agreed that they applied previous technical knowledge with fewer agreeing they analyzed different ways of structuring the solution. This shows a contrast between architecture self-efficacy (little application of knowledge or analysis of solutions) against a perceived large number of ideas contributed.

5.2.6 Respondents' Learnings. The main learnings from the hackathon were in the areas of **prompt engineering (23 responses), teamwork (23), and creative thinking (21)**. As summed up by one respondent, "It was a very light and fun hackathon! We were able to test several ideas, use AI in almost every step, and learn a lot in the process, all in a super collaborative atmosphere." Note the first learning (prompt engineering) is aligned with the motivation of many to learn about vibe coding. Only 2 respondents indicated they had not learned anything new.

Examining the intention to continue using AI (Figure 7), we **found strong intentions to use AI for prototyping but not programming activities**. Moreover, there is stronger intent to use AI for simple rather than complex programming. These results perhaps highlight a view that the AI tools are strong at prototyping (including generating ideas), but not yet good enough to develop an application, especially for more complex scenarios, due to quality issues leading to bugs and additional rework of the code.

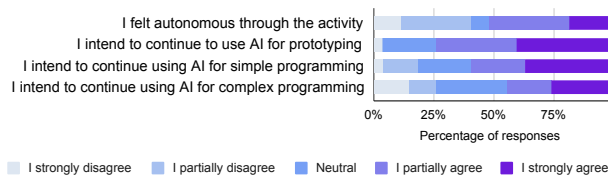


Figure 7: Intended use of AI going forward

5.3 Interviews

This section presents the interview results, with each section corresponding to key points that emerged from the clustering process.

5.3.1 Intensive learning and prompt engineering as skill and outcome. Across interviews, **participants framed vibe coding as a learning context where prompt engineering was both a skill and an outcome.** One participant emphasized iterative experimentation with inputs and outputs, reporting that different LLMs demanded tailored prompting, “*It was possible to train many inputs and outputs and test different input formats to get the desired output, each LLM responds to how you give the input and generates a particular output*” (P01). Others described a **shift from improvisation to more structured prompting** as the event progressed, “*after some errors, we started paying more attention to prompts, writing more in each one*” (P05). Participants also learned terminology through hands-on experience, as “*you learn the names of things, what a card is, what a footer is*” (P01).

5.3.2 Human creativity, domain knowledge, and social context. Human creativity, domain knowledge, and design thinking were seen as necessary complements to LLMs. A recurrent pattern was that **ideation benefited from facilitation.** As one put it, “*having someone skilled in design thinking to support the creative part and understand the problem pain points*” (P01). Participants often attributed idea ownership to the team while using AI to expand options, as seen in statements such as, “*Was it AI? No, the idea was ours from the start*” (P01) and “*Claude raised several issues and helped validate the problem*” (P02). Social context knowledge was a critical input for the creative process, especially for LGBTQIA+ safety app, which participants said the models did not fully capture: “*here is another social layer that ChatGPT does not grasp*” (P01).

5.3.3 Early discovery, prototyping, and critical refinement. Teams utilized **LLMs to accelerate early discovery and prototyping**, then exercised critical judgment to refine their work. Several credited AI with jump-starting brainstorming, “*above all, AI was invaluable for the start to begin iterating*” (P02), and “*for ideation and prototyping to validate a new idea, it is very interesting to use*” (P03). Designers highlighted how tools rapidly produced visually coherent layouts that would otherwise take longer, “*it is as if we struggle less to reach a well-composed component*” (P07). Yet participants maintained a critical stance, adjusting designs, “*it will give average answers, you must read with a critical eye*” (P02).

5.3.4 Tools comparative evaluations and combinations. Participants statements on **tool comparisons were consistent.** Lovable was repeatedly rated as the most effective for front-end scaffolding,

while V0 drew criticism for code quality. One participant rated the outputs as follows: “*I rated quality, Lovable 9.5 out of 10... V0 8 out of 10*” (P01), whereas another stated, “*V0 code quality is not great*” (P02). The Stitch tool was appreciated for fast prototyping but less refinement: “*the screens were very mid-fidelity*” (P07). Participants frequently funneled prompts through ChatGPT to refine instructions for other LLMs, “*every time we sent a prompt to Lovable or V0, it went through ChatGPT first*” (P02). The **teams employed multiple tools in a pipeline-like process.** As P09 described: “*I moved results from one tool to another when I needed a result that was close to what the first had given, exporting so the next tool could continue from that base*” (P09).

5.3.5 Collaboration workflows and roles. Collaboration practices blended human tasking with AI delegation, often mediated by prompt documents and Kanban. One team described a hybrid pipeline that separated prompting and manual coding: “*We divided what could be solved by prompt and what required manual work*” (P01). Another approach used a shared Google Docs document for prompts: “*There was a shared doc where everyone built the prompt*” (P05). Some groups experimented in parallel across platforms using a prompt master: “*We reached a prompt master, tested it across services, then refined it further*” (P09). Leadership and role fluidity emerged alongside this, such as product-oriented leadership, as exemplified by “*I felt comfortable leading as the product person*” (P02), and explicit prompt engineer roles, where “*I was responsible for prompts*” (P01).

5.3.6 Speed gains, code quality, and stability limits. Participants reported **both speed gains and uneven code quality.** Many celebrated how a single detailed prompt produced most of the front-end, noting that “*with one prompt it generated about 80 percent of the solution*” (P03) and “*the front was very complete and complex*” (P05). Others flagged fragile or incoherent outputs, especially with navigation and integration, “*in integrating screens, it failed to separate components and the structure was not good*” (P04). **Stability issues were common,** “*sometimes it worked, sometimes it did not*” (P05), and participants cautioned that production standards are not met, “*it is very hard for [the code generation tool] to understand an application’s design patterns, even if the generated code is good [...] it may not follow the commit standards.*” (P03).

5.3.7 Constraints, frictions, and coping strategies. Constraints and frictions shaped strategy. Strict **token or credit limits pushed teams toward fewer, better elaborated prompts and careful planning:** “*We only had ten [credits], so we waited to include as much as possible in one go*” (P02). Some used workarounds, “*share the project link, duplicate it, credits reset*” (P01). Time pressure also led to **trusting AI too much, which backfired:** “*When time was tight, we threw things at the AI and problems started*” (P06).

5.3.8 Negotiating AI suggestions and product scope. Participants negotiated the boundary between human creativity and AI suggestions. Several felt **LLMs proposed prominent features, useful for validation but not originality,** “*support to suggest some features, we wanted to go beyond the obvious*” (P01). Others appreciated **average but serviceable ideas,** “*it was the average idea, which*

we needed for validation" (P02). Human judgments constrained AI-generated breadth, "we feared it would be too much, we needed the minimum viable" (P02).

5.3.9 *Experience, background, and learning with AI.* Experience, background, and generational habits influenced how participants leveraged LLMs. Some described **AI as an amplifier for novices and a tutor for coding gaps**, "I would have been more useless without AI" (P01), and "I use AI as my pet junior" (P08). Others **contrasted cohorts that learned to program pre-AI with those who began with AI at hand**, "my programming start was entirely with AI" (P01). Even skeptics acknowledged the value of prototyping, while warning about reliability and learning costs, noting that "code quality is worse and less reliable" (P04) and that "prompt engineering is a skill everyone will need" (P03).

5.3.10 *Current scope and perceived value of vibe coding.* The consensus places **vibe coding's sweet spot in early-stage design and functional prototyping**, rather than production. As one summarized, "it exists for prototyping and needs several rounds to become a complete product" (P09). Yet within that scope, teams reported confidence and satisfaction, "it was light and fun, natural language gives a sense of closeness to the solution" (P03), and "in a one-day hackathon, getting to a shippable proposal is greatly helped" (P07). Students from other fields were satisfied with learning and one of them became a vibe coding enthusiast and did a project of her own after the event: "I also learned a lot there [...] the tools you taught. I've even already used them for something I was curious to do" (P10).

6 Discussion

This section synthesizes our findings to characterize the educational experience of vibe coding hackathons and extract lessons learned.

6.1 General Findings

We identified four major themes that characterize the experience of the vibe coding hackathon.

6.1.1 *Psychological safety and confidence building.* Although the exit survey rarely made this explicit, at least one open-ended response described the event as a way to gain confidence to engage with hackathons. This aligns with our qualitative evidence that LLMs can act as low-stakes scaffolds in early discovery and prototyping (e.g., faster "first drafts" of UIs and code), thereby reducing the perceived cost of "getting started". In our context, the combination of an inclusive one-day format, access to GenAI tools, and light mentoring appears to have lowered the barrier for novices without displacing human judgment or teamwork.

6.1.2 *Cross-disciplinary participation as enrichment, not replacement.* The majority of participants were computing students, but the presence of even a small number of non-computing participants (15%) introduced perspectives that technical teams alone rarely highlighted. Design and humanities students reported focusing on accessibility, inclusiveness, and communication aspects. This suggests that diversity — even in small proportions — can enhance hackathon learning outcomes. However, our data also highlights that attracting non-technical participants remains a challenge.

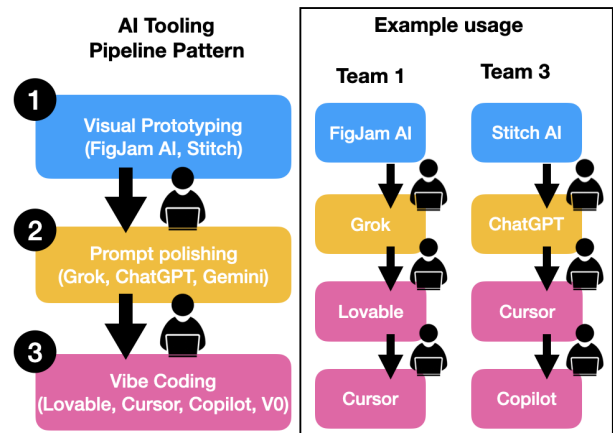


Figure 8: Typical AI tooling pipeline employed by teams

6.1.3 *Premature convergence in ideation.* Our findings suggest that GenAI was consistently used to rapidly turn initial ideas into concrete ones, but this often led to early convergence. While participants praised the ability of GenAI tools to generate "first drafts", they also tended to stop iterating once a viable idea was on the table. This pattern contrasts with the typical hackathon dynamic, where commonly a broader range of potential solutions is considered. Educators and organizers should therefore consider scaffolds that explicitly encourage divergent thinking (e.g., requiring multiple candidate prompts before committing), so that the benefits of GenAI do not come at the cost of creative breadth.

6.1.4 *Vibe coding as orchestration of tool pipelines.* Students combined different GenAI tools, following a pipeline as illustrated in Figure 8. First, they would generate prototypes with tools such as FigJam and Google Stitch². They would then decide which prototype to use as input for vibe coding tools. Usually, the prompts would be polished with tools such as ChatGPT or Gemini. The refined prompts would be used in tools specialized in generating apps (e.g., Lovable, Cursor, V0), and output projects would eventually be exported to be polished with other tools (e.g., Copilot).

6.2 Lessons Learned

This subsection synthesizes our key takeaways from the vibe coding hackathon, grouping positive insights and areas for improvement to inform future events.

What worked (+)

- + *Inclusive entry point:* Non-programmers were able to contribute meaningfully and, in some cases, deliver results comparable to programmers.
- + *Psychological safety for newcomers:* First-time participants treated the event as a confidence-building on-ramp to software creation with AI.
- + *Speed for prototyping:* Teams moved from ideas to functional prototypes quickly, generating and discarding alternatives at low cost.

²<https://stitch.withgoogle.com/>

- + *Prompt practices improved under constraints.* Credit and time limits encouraged careful, prompt planning, shared prompt logs, and iterative refinement.
- + *Cross-disciplinary value:* Even limited participation by non-computing students improved framing, accessibility, and design quality.
- + *Make the on-ramp explicit:* Advertising the format as low-stakes and providing a short prompt clinic and mentor access helped increase inclusivity.
- + *More progress in shorter time.* Enables shorter, less exhausting events, appropriate for participants with family duties and other appointments.

What to change (-)

- *Broaden recruitment beyond computing:* Outreach and incentives were insufficient to attract non-computing participants at scale. Future editions should partner with non-CS programs, student societies, and advisors, and should tailor messaging to emphasize creative roles, design, and domain expertise.
- *Focus the challenge:* The theme generator produced heterogeneous problem scopes, which complicated evaluation and favored topics with higher perceived social impact. Provide a small menu of focused themes with aligned judging criteria, or run parallel tracks with separate awards.
- *Counter premature convergence:* GenAI accelerated ideation but encouraged early lock-in. Introduce light scaffolds that promote divergence, for example, a required round with at least three distinct concepts and corresponding prompt variants before committing.
- *Strengthen software engineering learning:* Production-grade practices remained limited within a one-day format. Add optional mini-checkpoints on testing, simple quality gates, and short debriefs on maintainability to connect prototyping with core SE concepts.

6.3 Limitations and Threats to Validity

This work has limitations, particularly since it is an experience report rather than an empirical study. Participation was skewed toward computing students, which may have influenced both the pace of progress and the types of challenges encountered. The hackathon was short, which favored prototyping and limited the observation of sustained software engineering practices, including testing and refactoring. Due to a decision to keep the survey short, we did not thoroughly examine perceived SE self-efficacy, other than in the context of architecture. The study focused on a single institutional context and a specific configuration of tools, which affects transferability. We mitigated threats to validity through method triangulation, careful transcription and anonymization, and a transparent analysis process that combined open coding, model-assisted clustering, and human verification.

7 Conclusions

Vibe coding enabled novice and mixed-experience students to move from ideas to functioning prototypes within a single-day hackathon.

Through the analysis of data from observations, survey, and interviews, we found that the approach supported rapid ideation, front-end scaffolding, and cross-disciplinary collaboration. Participants treated prompt engineering as a learnable skill, and teams developed lightweight practices to share, refine, and compare prompts.

The educational value lies in creating low-risk settings where students co-create with AI while retaining human judgment. Organizers can amplify learning by making prompting practices visible, encouraging critical review, and planning for practical constraints such as tool limits. Within these boundaries, vibe coding functions well for early discovery and functional prototyping, while production-quality engineering remains out of scope.

Since this is an experience report, we do not claim generalizability. The findings are situated in a single context and a short event. We offer grounded, practice-oriented takeaways for educators and hackathon organizers who wish to design inclusive activities that develop AI collaboration skills without sacrificing human oversight. Future work should examine longer formats and more diverse cohorts to connect rapid prototyping with instruction in other Software Engineering topics such as testing and architecture.

Acknowledgments

ChatGPT and Claude were utilized to generate sections of this work, including text (details in the method section) and translations from Portuguese to English. The generated text was reviewed by at least one author. This work was partially supported by INES.IA (National Institute of Science and Technology for Software Engineering Based on and for Artificial Intelligence) www.ines.org.br, CNPq grant 408817/2024-0. The authors acknowledge the partial support provided by Liferay and Revelatio Studio for the organization of Vibe Hack.

References

- [1] Abasi-Amefon Obot Affia, Kiev Gama, James D Herbsleb, and Alexander Nolte. 2025. How to organize an in-person, online or hybrid hackathon—A revised planning kit. *arXiv preprint arXiv:2008.08025* (2025).
- [2] Abasi-amefon Obot Affia, Alexander Nolte, and Raimundas Matulevičius. 2022. Integrating Hackathons into an Online Cybersecurity Course. In *Proceedings of the ACM/IEEE 44th International Conference on Software Engineering: Software Engineering Education and Training* (Pittsburgh, Pennsylvania) (ICSE-SEET '22). Association for Computing Machinery, New York, NY, USA, 134–145. doi:10.1145/3510456.3514151
- [3] Shahad Alkamli, Maha Al-Yahya, and Khulood Alyahya. 2024. Ethical and Legal Considerations of Large Language Models: A Systematic Review of the Literature. In *2024 2nd International Conference on Foundation and Large Language Models (FLLM)*. IEEE, 576–586. doi:10.1109/FLLM63129.2024.10852451
- [4] Andrej Karpathy [@karpathy]. 2025. There's a New Kind of Coding I Call "Vibe Coding". <https://x.com/karpathy/status/1886192184808149383>
- [5] Muneera Bano, Rashina Hoda, Didar Zowghi, and Christoph Treude. 2024. Large language models for qualitative research in software engineering: exploring opportunities and challenges. *Automated Software Engineering* 31, 1 (2024), 8.
- [6] Markus Borg, Elizabeth Bjarnason, and Fabian Hedin. 2025. Vibe coding and the new prototyping playbook. *IEEE Software* 42, 6 (2025), 12–16.
- [7] Javier Cámara, Javier Troya, Julio Montes-Torres, and Francisco J Jaime. 2024. Generative ai in the software modeling classroom: An experience report with chatgpt and unified modeling language. *IEEE Software* 41, 6 (2024), 73–81.
- [8] claude 2025. Claude. <https://claude.ai/>
- [9] Michael R Crusoe and C Titus Brown. 2016. Channeling Community Contributions to Scientific Software: A sprint Experience. *Journal of open research software* 4, 1 (2016).
- [10] cursor 2025. Cursor: The best way to code with AI. <https://cursor.com/en>
- [11] Jeanette Falk, Alexander Nolte, Daniela Huppenkothen, Marion Weinzierl, Kiev Gama, Daniel Spikol, Erik Tollerud, Neil P. Chue Hong, Ines Knäpper, and Linda Bailey Hayden. 2024. The Future of Hackathon Research and Practice. *IEEE access : practical innovations, open solutions* 12 (2024), 133406–133425.

- doi:10.1109/ACCESS.2024.3455092
- [12] Jeanette Falk Olesen and Kim Halskov. 2020. 10 years of research with and on hackathons. In *Proceedings of the 2020 ACM designing interactive systems conference*. Association for Computing Machinery, 1073–1088.
 - [13] Scott Freeman, Sarah L Eddy, Miles McDonough, Michelle K Smith, Nnadozie Okoroafor, Hannah Jordt, and Mary Pat Wenderoth. 2014. Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the national academy of sciences* 111, 23 (2014), 8410–8415.
 - [14] Kiev Gama. 2017. Preliminary Findings on Software Engineering Practices in Civic Hackathons. In *2017 IEEE/ACM 4th International Workshop on CrowdSourcing in Software Engineering (CSI-SE)*. IEEE, 14–20. doi:10.1109/CSI-SE.2017.5
 - [15] Kiev Gama, Breno Alencar Gonçalves, and Pedro Alessio. 2018. Hackathons in the Formal Learning Process. In *Proceedings of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education (ITiCSE 2018)*. Association for Computing Machinery, Larnaca, Cyprus and New York, NY, USA, 248–253. doi:10.1145/3197091.3197138
 - [16] Kiev Gama, Filipe Calegario, Victoria Jackson, Alexander Nolte, Luiz Augusto Morais, and Vinicius Cardoso Garcia. 2025. Supplementary Material - ICSE SEET 2026 article: "Can you feel the vibes?": An exploration of novice programmer engagement with vibe coding. (12 2025). doi:10.6084/m9.figshare.30227314.v2
 - [17] Kiev Gama, George Valença, Pedro Alessio, Rafael Formiga, André Neves, and Nycolas Lacerda. 2023. The developers' design thinking toolbox in hackathons: a study on the recurring design methods in software development marathons. *International Journal of Human-Computer Interaction* 39, 12 (2023), 2269–2291.
 - [18] Francis Geng, Anshul Shah, Haolin Li, Nawab Mulla, Steven Swanson, Gerald Soosai Raj, Daniel Zingaro, and Leo Porter. 2025. Exploring Student-AI Interactions in Vibe Coding. *arXiv preprint arXiv:2507.22614* (2025). arXiv:2507.22614
 - [19] Mairéad Hogan. 2022. Hackathons as a Tool for Authentic Learning. In *Proceedings of the 27th ACM Conference on Innovation and Technology in Computer Science Education Vol. 2*. Association for Computing Machinery, 582–584.
 - [20] Irene Hou, Owen Man, Kate Hamilton, Srishty Muthusekaran, Jeffin Johnykutty, Leili Zadeh, and Stephen MacNeil. 2025. 'All Roads Lead to ChatGPT': How Generative AI is Eroding Social Interactions and Student Learning Communities. In *Proceedings of the 30th ACM Conference on Innovation and Technology in Computer Science Education V. 1* (Nijmegen, Netherlands) (ITiCSE 2025). Association for Computing Machinery, New York, NY, USA, 79–85. doi:10.1145/3724363.3729024
 - [21] Dong Huang, Jie M Zhang, Qingwen Bu, Xiaofei Xie, Junjie Chen, and Heming Cui. 2024. Bias testing and mitigation in llm-based code generation. *ACM Transactions on Software Engineering and Methodology* (2024).
 - [22] Mehmet Kara, Fatih Erdogdu, Mehmet Kokoç, and Kursat Cagiltay. 2019. Challenges faced by adult learners in online distance education: A literature review. *Open Praxis* 11, 1 (2019), 5–22.
 - [23] Chris Kerslake, Paul Denny, IV Smith, David H., James Prather, Juho Leinonen, Andrew Luxton-Reilly, and Stephen MacNeil. 2024. Integrating Natural Language Prompting Tasks in Introductory Programming Courses. In *Proceedings of the 2024 on ACM Virtual Global Computing Education Conference V. 1* (Virtual Event, NC, USA) (SIGCSE Virtual 2024). Association for Computing Machinery, New York, NY, USA, 88–94. doi:10.1145/3649165.3690125
 - [24] Hieke Keuning, Isaac Alpizar-Chacon, Ioanna Lykourantzou, Lauren Beehler, Christian Köppe, Imke de Jong, and Sergey Sosnovsky. 2024. Students' Perceptions and Use of Generative AI Tools for Programming Across Different Computing Courses. In *Proceedings of the 24th Koli Calling International Conference on Computing Education Research (Koli Calling '24)*. Association for Computing Machinery, New York, NY, USA, Article 14, 12 pages. doi:10.1145/3699538.3699546
 - [25] Gene Kim and Steve Yegge. 2025. What Is Vibe Coding? It's Not About Turning Off Your Brain. <https://itrevolution.com/articles/what-is-vibe-coding-its-not-about-turning-off-your-brain/>.
 - [26] David R Krathwohl. 2002. A revision of Bloom's taxonomy: An overview. *Theory into practice* 41, 4 (2002), 212–218.
 - [27] Christian Meske, Tobias Hermanns, Esther von der Weiden, Kai-Uwe Loser, and Thorsten Berger. 2025. Vibe Coding as a Reconfiguration of Intent Mediation in Software Development: Definition, Implications, and Research Agenda. *arXiv preprint arXiv:2507.21928* (2025). arXiv:2507.21928
 - [28] Arnab Nandi and Meris Mandernach. 2016. Hackathons as an informal learning platform. In *Proceedings of the 47th ACM Technical Symposium on Computing Science Education*. ACM, Association for Computing Machinery, 346–351.
 - [29] Alexander Nolte. 2019. Touched by the hackathon: a study on the connection between hackathon participants and start-up founders. In *Proceedings of the 2nd ACM SIGSOFT international workshop on software-intensive business: start-ups, platforms, and ecosystems*. 31–36.
 - [30] Alexander Nolte, Linda Bailey Hayden, and James D Herbsleb. 2020. How to support newcomers in scientific hackathons-an action research study on expert mentoring. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW1 (2020), 1–23.
 - [31] Sarah O'Connor. 2025. 'Vibe Coding' Is the New DIY. *Financial Times* (June 2025). <https://www.ft.com/content/f4f3def2-2858-4239-a5ef-a92645577145>
 - [32] Lavinia Paganini and Kiev Gama. 2020. Engaging Women's Participation in Hackathons: A Qualitative Study with Participants of a Female-focused Hackathon. In *International Conference on Game Jams, Hackathons and Game Creation Events 2020*. Association for Computing Machinery, 8–15.
 - [33] Ei Pa Pa Pe-Than, Alexander Nolte, Anna Filippova, Christian Bird, Steve Scallen, and James Herbsleb. 2022. Corporate hackathons, how and why? A multiple case study of motivation, projects proposal and selection, goal setting, coordination, and outcomes. *Human-Computer Interaction* 37, 4 (2022), 281–313.
 - [34] Olga Petrovska, Lee Clift, Faron Moller, and Rebecca Pearsall. 2024. Incorporating Generative AI into Software Development Education. In *Proceedings of the 8th Conference on Computing Education Practice* (Durham, United Kingdom) (CEP '24). Association for Computing Machinery, New York, NY, USA, 37–40. doi:10.1145/3633053.3633057
 - [35] Veronica Pimenova, Sarah Fakhoury, Christian Bird, Margaret-Anne Storey, and Madeline Endres. 2025. Good Vibrations? A Qualitative Study of Co-Creation, Communication, Flow, and Trust in Vibe Coding. *arXiv preprint arXiv:2509.12491* (2025).
 - [36] Jari Porras, Jayden Khakurel, Jouni Ikonen, Ari Happonen, Antti Knutas, Antti Herala, and Olaf Drögehorn. 2018. Hackathons in software engineering education: lessons learned from a decade of events. In *Proceedings of the 2nd intl workshop on software engineering education for Millennials*. Association for Computing Machinery, 40–47.
 - [37] James Prather, Juho Leinonen, Natalie Kiesler, Jamie Gorson Benario, Sam Lau, Stephen MacNeil, Narges Norouzi, Simone Opel, Vee Pettit, Leo Porter, Brent N. Reeves, Jaromir Savelka, IV Smith, David H., Sven Strickroth, and Daniel Zingaro. 2025. Beyond the Hype: A Comprehensive Review of Current Trends in Generative AI Research, Teaching Practices, and Tools. In *2024 Working Group Reports on Innovation and Technology in Computer Science Education* (Milan, Italy) (ITiCSE 2024). Association for Computing Machinery, New York, NY, USA, 300–338. doi:10.1145/3689187.3709614
 - [38] James Prather, Brent N Reeves, Paul Denny, Brett A Becker, Juho Leinonen, Andrew Luxton-Reilly, Garrett Powell, James Finnie-Ansley, and Eddie Antonio Santos. 2023. "It's weird that it knows what i want": Usability and interactions with copilot for novice programmers. *ACM transactions on computer-human interaction* 31, 1 (2023), 1–31.
 - [39] James Prather, Brent N Reeves, Juho Leinonen, Stephen MacNeil, Arisoa S Randrianasolo, Brett A. Becker, Bailey Kimmel, Jared Wright, and Ben Briggs. 2024. The Widening Gap: The Benefits and Harms of Generative AI for Novice Programmers. In *Proceedings of the 2024 ACM Conference on International Computing Education Research - Volume 1* (Melbourne, VIC, Australia) (ICER '24). Association for Computing Machinery, New York, NY, USA, 469–486. doi:10.1145/3632620.3671116
 - [40] replit 2025. Replit - Build apps and sites with AI. <https://replit.com/>
 - [41] Mitchel Resnick, Mary Flanagan, Caitlin Kelleher, Matthew MacLaurin, Yoshiki Ohshima, Ken Perlin, and Robert Torres. 2009. Growing up programming: democratizing the creation of dynamic, interactive media. In *CHI'09 Extended Abstracts on Human Factors in Computing Systems*. Association for Computing Machinery, 3293–3296.
 - [42] Anthony Robins, Janet Rountree, and Nathan Rountree. 2003. Learning and teaching programming: A review and discussion. *Computer science education* 13, 2 (2003), 137–172.
 - [43] Kevin Roose. 2025. Not a Coder? With A.I., Just Having an Idea Can Be Enough. <https://www.nytimes.com/2025/02/27/technology/personaltech/vibecoding-ai-software-programming.html>.
 - [44] Advait Sarkar and Ian Drosos. 2025. Vibe Coding: Programming through Conversation with Artificial Intelligence. *arXiv preprint arXiv:2506.23253* (2025). arXiv:2506.23253
 - [45] Matthew S. Smith. 2025. AI Vibe Coding: Engineers' Secret to Fast Development - IEEE Spectrum. <https://spectrum.ieee.org/vibe-coding>.
 - [46] Stack Overflow 2025. 2025 Stack Overflow Developer Survey. <https://survey.stackoverflow.co/2025>
 - [47] Caio Steglich, Sabrina Marczak, Luiz Guerra, Cássio Trindade, Alessandra Dutra, and Ana Bachelo. 2021. An Online Educational Hackathon to Foster Professional Skills and Intense Collaboration on Software Engineering Students. In *Brazilian Symposium on Software Engineering*. Association for Computing Machinery, 388–397.
 - [48] Caio Steglich, Larissa Salerno, Thais Fernandes, Sabrina Marczak, Alessandra Dutra, Ana Paula Bachelo, and Cássio Trindade. 2020. Hackathons as a pedagogical strategy to engage students to learn and to adopt software engineering practices. In *Proceedings of the XXXIV Brazilian Symposium on Software Engineering*. Association for Computing Machinery, 670–679.
 - [49] Chris Stokel-Walker. 2025. What Is Vibe Coding, Should You Be Doing It, and Does It Matter? <https://www.newscientist.com/article/2473993-what-is-vibe-coding-should-you-be-doing-it-and-does-it-matter/>.
 - [50] Nisha Talagala. 2025. What Is Vibe Coding? And Why Should You Care? <https://www.forbes.com/sites/nishatalagala/2025/03/30/what-is-vibe-coding-and-why-should-you-care/>.
 - [51] Nick Taylor and Loraine Clarke. 2018. Everybody's hacking: Participation and the mainstreaming of hackathons. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, 1–12.

- [52] Bianca Trinkenreich, Fabio Calefato, Geir Hanssen, Kelly Blincoe, Marcos Kalinowski, Mauro Pezzè, Paolo Tell, and Margaret-Anne Storey. 2025. Get on the Train or be Left on the Station: Using LLMs for Software Engineering Research. In *Proceedings of the 33rd ACM International Conference on the Foundations of Software Engineering*. 1503–1507.
- [53] Ayca Tuzmen. 2024. Use of Generative Artificial Intelligence in the Education of Software Verification and Validation. In *2024 IEEE Frontiers in Education Conference (FIE)*. IEEE, IEEE, 1–6.
- [54] Jeremy Warner and Philip J Guo. 2017. Hack. edu: Examining how college hackathons are perceived by student attendees and non-attendees. In *Proceedings of the 2017 ACM Conference on International Computing Education Research*. Association for Computing Machinery, 254–262.
- [55] Rhiannon Williams. 2025. What Is Vibe Coding, Exactly? <https://www.technologyreview.com/2025/04/16/1115135/what-is-vibe-coding-exactly/>.
- [56] Scooter Willis, Greg Byrd, and Brian David Johnson. 2017. Challenge-Based Learning. *Computer* 50, 7 (2017), 13–16.
- [57] Ramazan Yilmaz and Fatma Gizem Karaoglan Yilmaz. 2023. The effect of generative artificial intelligence (AI)-based tool use on students' computational thinking skills, programming self-efficacy and motivation. *Computers and Education: Artificial Intelligence* 4 (2023), 100147. doi:10.1016/j.caeai.2023.100147
- [58] Qianli Yuan and Mila Gasco-Hernandez. 2021. Open innovation in the public sector: creating public value through civic hackathons. *Public Management Review* 23, 4 (2021), 523–544.