# Reqcraft: An AI-Based Interview Simulator to Support Requirements Elicitation Learning in Software Engineering Education

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## Abstract

**Context:** Teaching requirements elicitation remains challenging in Software Engineering education, as it requires the development of communication, analytical, and critical thinking skills in realistic settings. **Goal:** This paper presents and evaluates Reqcraft, an AI-based interview simulator designed to support students' learning of requirements elicitation through interactive and realistic client simulations. **Method:** We conducted a mixed-methods study with 100 undergraduate students enrolled in Requirements Engineering courses. Data were collected through a survey combining Likert-scale questions and open-ended responses, and complemented with interviews with two experienced instructors. **Results:** The results indicate that Reqcraft improves students' understanding of the elicitation process, enhances their ability to formulate questions, and supports the identification of functional and non-functional requirements. Students reported high levels of engagement and perceived realism, while instructors highlighted improvements in communication and collaborative learning. Some limitations were observed, particularly related to system performance and interaction constraints. **Conclusion:** AI-based simulators such as Reqcraft represent a promising approach to complement traditional teaching methods in Requirements Engineering by providing scalable, interactive, and practice-oriented learning experiences.

## Keywords

Requirements Engineering, Requirements Elicitation, AI-based Simulation, Generative AI, Empirical Evaluation

**Table 1: Survey Questions and Mapping to RQs**

| ID | Survey Question | RQ addressed |
|---|---|---|
| Q1 | Do you consent to participate in this study? | – |
| Q2 | E-mail | – |
| Q3 | What is your current state of residence? | – |
| Q4 | How do you identify yourself (gender)? | – |
| Q5 | What is your age group? | – |
| Q6 | What is your current level of education? | – |
| Q7 | What program are you enrolled in? | – |
| Q8 | Have you used ChatGPT before? | – |
| Q9 | How frequently do you use ChatGPT? | – |
| Q10 | What is your experience with requirements elicitation? | – |
| Q11.1 | Reqcraft helped me better understand the requirements elicitation process. | RQ1 |
| Q11.2 | Reqcraft improved my ability to identify requirements. | RQ1 |
| Q11.3 | Reqcraft responses resembled interaction with a real client. | RQ2 |
| Q11.4 | Reqcraft allowed me to conduct the interview at my own pace. | RQ2 |
| Q11.5 | Reqcraft supported analysis, problem-solving, and application of concepts to real situations. | RQ1 |
| Q11.6 | Reqcraft response time was similar to a natural conversation. | RQ2 |
| Q11.7 | Reqcraft supported the development of communication and information evaluation skills. | RQ1 |
| Q11.8 | Reqcraft enabled self-organization and independent learning. | RQ1 |
| Q11.9 | Reqcraft facilitated self-assessment and reflection. | RQ1 |
| Q11.10 | The feedback provided by Reqcraft helped identify issues and improvements in my requirements. | RQ1 |
| Q12 | How was your experience using Reqcraft? | RQ1 |
| Q13 | What did you learn using Reqcraft that you consider most important? | RQ1 |
| Q14 | Which aspects of Reqcraft were most useful or interesting for learning? | RQ1 |
| Q15 | Did you encounter any difficulties when using Reqcraft? If yes, describe. | RQ2 |
| Q16 | What improvements would you suggest to make Reqcraft more effective? | RQ2 |
| Q17 | Did the tool adapt to students' needs and levels? Why? | RQ2 |
| Q18 | Should institutions train students to use ChatGPT more effectively? Why? | RQ2 |
| Q19 | Please add any additional comments about the experience. | RQ1 |

**Table 2: Codebook for Q12 – Students' experience using Reqcraft**

| Category | # | Subcategories |
|---|---|---|
| **Positive Learning Experience** | 42 | Very good experience; enjoyable learning; useful and relevant experience; engaging and interesting tool; overall satisfaction |
| **Realism and Simulation** | 28 | Realistic interaction with clients; simulation of real-world scenarios; approximation to real interviews; dynamic and natural conversations; unpredictability of clients |
| **Practical Learning and Skill Development** | 24 | Learning by doing; practicing interviews; understanding elicitation in practice; applying concepts; hands-on experience |
| **Feedback and Evaluation** | 18 | Final evaluation; feedback on errors and improvements; detailed assessment; identifying strengths and weaknesses |
| **Ease of Use and Usability** | 16 | Easy to use; intuitive interaction; well-organized system; clear structure; accessible interface |
| **Support for Understanding Requirements** | 14 | Understanding elicitation process; identifying requirements; functional vs non-functional understanding; structuring requirements |
| **Communication and Interaction** | 13 | Interaction with clients; communication skills; adapting to non-technical users; conversational engagement |
| **Challenges and Limitations** | 11 | Initial confusion; difficulty understanding system responses; vague or inconsistent answers; system rigidity; limitations in interaction |
| **Engagement and Motivation** | 9 | Fun and enjoyable experience; increased interest in the subject; motivation to learn; curiosity about AI tools |

**Table 3: Codebook for Q13 – Main learning outcomes reported by students after using Reqcraft**

| Category | # | Subcategories |
|---|---|---|
| **Questioning Skills** | 31 | Asking clear and well-structured questions; asking the right questions; being specific and objective; choosing appropriate question types; improving questioning strategies |
| **Understanding Client Needs** | 22 | Understanding what the client really needs; identifying the real problem behind the request; focusing on the client's pain points; looking at the problem from the client's perspective; understanding priorities and needs |
| **Requirements Knowledge** | 20 | Distinguishing functional and non-functional requirements; identifying important requirements; detailing requirements; understanding essential requirements; recognizing priorities among requirements |
| **Elicitation Process Awareness** | 17 | Elicitation as an investigative activity; requirements need to be extracted rather than simply collected; prioritization during interviews; structuring and conducting interviews; validating information |
| **Communication and Interaction** | 15 | Communication with clients; interaction with stakeholders; dealing with clients with limited technical knowledge; adapting communication style; conversational dynamics |
| **Critical Thinking and Problem Analysis** | 11 | Identifying hidden problems; analyzing beyond the obvious; thinking critically about scenarios; linking client statements to system problems and solutions |
| **Feedback and Self-improvement** | 6 | Recognizing mistakes; understanding where to focus; improving based on feedback; clarifying doubts |
| **Organization and Structuring** | 6 | Organizing ideas; organizing interview flow; structuring reasoning; organizing requirements and data |

**Table 4: Codebook for Q14 – Most Useful and Interesting Aspects of Reqcraft for Learning**

| Category | # | Subcategories |
|---|---|---|
| **Realistic Simulation** | 36 | Simulation of interviews; real-world scenarios; realistic dialogue; client behavior; conversational flow; immersion in professional context |
| **Feedback and Evaluation** | 33 | Final evaluation; feedback on errors and improvements; detailed feedback; performance assessment; identification of missing or incomplete requirements |
| **Communication and Interaction** | 24 | Communication skills; dialogue dynamics; humanized interaction; conversational clarity; interaction with clients |
| **Questioning and Interview Skills** | 21 | Structuring questions; asking objective questions; directing the conversation; interview organization; elicitation strategies |
| **Interactivity and Responsiveness** | 17 | Fast responses; variability of answers; system responsiveness; dynamic interaction |
| **Learning Environment and Practice** | 15 | Safe environment; learning by doing; experimentation; practical exercises; training scenarios |
| **Process Structuring and Guidance** | 12 | Organization of reasoning; structured elicitation process; guidance during interviews; cognitive support |
| **Requirements Understanding** | 11 | Identifying requirements; organizing requirements; understanding system context; translating needs into requirements |
| **Constraints and Design Features** | 9 | Limit of 12 questions; scenario variety; client personalities; difficulty levels |

**Table 5: Codebook for Q19 – Additional contributions and reflections about the exercise**

| Category | # | Subcategories |
|---|---|---|
| **Perceived Educational Value** | 34 | Important for learning; useful for understanding elicitation; supports practical knowledge; reinforces course content; improves learning outcomes |
| **Bridging Theory and Practice** | 26 | Connecting theory to real-world practice; applying concepts in realistic scenarios; understanding elicitation beyond theory; experiential learning |
| **Skill Development** | 22 | Development of communication skills; critical thinking; requirements analysis; interview preparation; problem understanding |
| **Positive Feedback and Satisfaction** | 20 | Praise for the tool; positive experience; recognition of initiative; engagement and motivation; appreciation of the approach |
| **Suggestions for Improvement** | 18 | More scenarios; more complex cases; additional activities; improved feedback explanations; better conversational responses; inclusion of real clients |
| **Realism and Practical Application** | 14 | Realistic simulation; practical exercises; interaction with client-like personas; simulation of real business problems |
| **Autonomy and Learning Support** | 9 | Encouragement of self-learning; iterative learning; trial-and-error learning; ability to repeat and improve performance |
| **Limitations and Criticism** | 7 | Issues with responses; lack of clarity in some interactions; perceived rigidity; need for improvement in AI behavior |
| **No Additional Contribution** | 15 | No comments; no additional suggestions; neutral responses |

**Table 6: Codebook for Q15 – Difficulties encountered when using Reqcraft**

| Category | # | Subcategories |
|---|---|---|
| **No Difficulties Reported** | 46 | No issues; easy to use; intuitive interaction; smooth experience; no barriers during use |
| **Initial Learning Curve** | 18 | Difficulty at the beginning; understanding how to use the tool; adapting to interaction model; improvement over time |
| **Question Formulation Challenges** | 21 | Difficulty in formulating questions; deciding what to ask; structuring questions; adapting questions during interaction |
| **Question Limit Constraint** | 14 | Managing the limit of 12 questions; pressure to optimize questions; difficulty covering all topics; planning question strategy |
| **Interaction and Communication Issues** | 12 | Difficulty maintaining natural conversation; rigid interaction flow; interpreting client responses; lack of conversational fluidity |
| **System Performance Issues** | 11 | System crashes; slow response; instability under multiple users; need to restart sessions; access limitations |
| **AI Response Limitations** | 9 | Incomplete or vague responses; repetitive answers; hallucinated information; unrealistic responses |
| **Understanding Client Language** | 7 | Difficulty translating informal client language into technical requirements; interpreting domain-specific expressions |
| **Interface and Usability Issues** | 5 | Lack of clarity in interface elements; insufficient detail in profiles; non-intuitive features |

**Table 7: Codebook for Q16 – Suggested improvements for enhancing Reqcraft effectiveness**

| Category | # | Subcategories |
|---|---|---|
| **More Examples and Learning Support** | 28 | More practical examples; example repositories; examples of good vs bad requirements; additional simulations; learning materials |
| **Enhanced Feedback and Guidance** | 24 | More detailed feedback; clearer evaluation; guidance during interviews; hints for missing topics; post-interview summaries |
| **Interaction and Realism Improvements** | 18 | More natural conversation; more human-like responses; more realistic client behavior; increased response complexity |
| **Adaptability and Personalization** | 15 | Different scenarios; more client profiles; difficulty levels; guided mode for beginners; adaptation to user knowledge |
| **Question Management and Flexibility** | 14 | Increase question limit; allow follow-up questions; reduce pressure of question limit; improve questioning flow |
| **System Performance and Scalability** | 12 | Support for multiple users; reduce system crashes; improve stability; faster response time |
| **Interface and Usability Improvements** | 10 | More intuitive interface; clearer information display; better organization of content; improved usability |
| **New Features and Functionalities** | 9 | Diagram feedback; saving requirements drafts; progress tracking; coverage metrics; requirement validation tools |
| **Instructional Support** | 8 | Tutorials; initial guidance; explanation of system usage; prompt engineering training; onboarding support |
| **No Improvements Suggested** | 13 | No suggestions; satisfied with current version; tool already considered adequate |

**Table 8: Codebook for Q17 – Perceived adaptability of Reqcraft to students' needs and levels**

| Category | # | Subcategories |
|---|---|---|
| **Adaptive and Flexible Interaction** | 32 | Conversation adapts to how questions are asked; flexible responses; dynamic interaction; natural adjustment of tone and depth |
| **Supports Different Skill Levels** | 27 | Suitable for beginners and advanced users; progressive difficulty; allows both basic and deeper exploration |
| **Self-Paced Learning** | 18 | Students progress at their own pace; autonomy in interaction; individualized learning rhythm |
| **Dependence on User Input (Prompt-driven Adaptation)** | 21 | Adaptation depends on question quality; level of challenge defined by student input; user controls depth of interaction |
| **Scenario and Client Variability** | 15 | Different client profiles; multiple scenarios; selectable difficulty levels; variation supports adaptation |
| **Partially Adaptable** | 14 | Works in general but with limitations; adaptation not consistent; depends on context |
| **Limited or No Adaptation** | 11 | Lack of true personalization; system does not fully adjust to user level; immersion limitations |
| **Challenges Affecting Adaptation** | 9 | Initial difficulty; question limit; lack of domain knowledge; difficulty understanding system behavior |

**Table 9: Codebook for Q18 – Perceptions about training students to use ChatGPT effectively**

| Category | # | Subcategories |
|---|---|---|
| **AI as Important Skill for the Future** | 36 | AI as future competency; market demand; professional relevance; "AI literacy" |
| **Support for Learning and Productivity** | 31 | Helps learning; improves productivity; supports problem-solving; assists study activities |
| **Need for Proper Training and Guidance** | 28 | Learning how to use correctly; structured prompting; training needed; responsible use |
| **AI as Support Tool (Not Replacement)** | 22 | Should be used as support; not a substitute; avoid dependency; tool vs crutch |
| **Development of Critical Thinking** | 15 | Need for validation; critical analysis; avoid blind trust; interpretation of results |
| **Concerns about Misuse or Dependency** | 14 | Copy-paste behavior; over-reliance; reduced cognitive effort; risk of misuse |
| **No Training Needed / Already Intuitive** | 9 | Easy to use; no need for training; already accessible |
| **Disagreement with Training** | 6 | Prefer focus on fundamentals; against early adoption; skepticism about AI use |