Универзитет „Св. Кирил и Методиј“ во Скопје
**ФАКУЛТЕТ ЗА ИНФОРМАТИЧКИ НАУКИ И КОМПЈУТЕРСКО ИНЖЕНЕРСТВО**

# Project Assignment 1: Conceptual Design
# Human-computer interaction design

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# Abstract

We are witnessing the importance of digital tools every day, they are even critical in some areas, but yet challenging to navigate or adapt to for some. For that reason, we conducted this research to investigate more about people's point of view about using learning digital tools to help us build a more comprehensive user-pleasing design approach. Our interviews focused on understanding how different users with diverse backgrounds interact with existing digital educational platforms.

By summarising these interviews, through empathy maps and collective brainstorming ideas we tried to identify the most wanted/needed options in digital learning tools and how AI can help us reach it.


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## Interview sets of questions

*We intentionally designed our interview sampling to capture a wide range of perspectives, selecting 9 participants across diverse backgrounds. Our target demographic spanned an age range of 15 to 45, deliberately including both students and educators to capture multifaceted insights into digital learning experiences. We divided the interviewees among us, so we formulated two sets of interview questions.*

## Interview type 1:

Includes:
1. 22 yrs old CS undergraduate student,
2. 24 yrs old  general medicine student,
3. 26 yrs old self taught Cosmetics salon business owner,
4. 39 yrs old elementary school teacher.

Here is a list of questions prepared and conducted for Interview 1:

1. Could you briefly introduce yourself and your background in your field of study or work?
2. How often do you engage with digital platforms for learning or professional development?
3. How do you typically approach learning new concepts or skills in your field?
4. What role do digital tools play in your learning process?
5. Can you describe a recent experience where you successfully learned something new using digital tools?
6. What are the biggest struggles you face when using digital platforms for learning or teaching?
7. Are there any specific tools or platforms that you find difficult to navigate or understand?
8. How do you overcome technical issues or lack of digital knowledge?
9. How do you choose which digital platform or tool to use for your learning or teaching needs?
10. What factors influence your decision-making (e.g., ease of use, features, recommendations)?
11. Do you rely on peer recommendations or online reviews before making a decision?
12. How do you feel when you're learning through digital platforms? (e.g., motivated, frustrated, confident)
13. Can you recall a moment when a digital tool made your learning experience more engaging and effective?
14. What aspects of digital platforms make you feel more confident and productive?
15. What features would make your learning experience smoother and more efficient?
16. If you could design the perfect learning environment, what improvements would you prioritize?
17. How do you see AI enhancing your learning or teaching process in the future?
18. What advice would you give to designers aiming to create a more user-friendly learning platform?
19. Is there anything I haven’t asked that you believe is important for me to understand?
20. Would you be open to testing a prototype once I develop some initial concepts?

## Interview type 2

Includes:

1. 24 yrs old CS graduate student, working as a full - stack developer,
2. 28 yrs old self taught succesfull developer,
3. 50 yrs old national bank's Vice Governor,
4. 18 yrs old Korcagin student,
5. 22 year old FINKI student

*Each interview followed a semi-structured format lasting 30-60 minutes. The interviews began with a consistent set of core questions asked of all participants to establish comparable baseline data. Following the core questions, we asked a set of tailored questions specific to each participant's unique background and context. This approach allowed us to gather both standardized data across all participants and specialized insights based on each individual's specific experience.*

**Universal Core Questions**

1. "Could you tell me about your background and your current relationship with learning or education?"
2. "What digital tools or platforms do you currently use for learning, and what works well or poorly about them?"
3. "Tell me about a time when you struggled to find or use educational resources. What were the pain points?"
4. "How do you decide which educational resources to use, and how do you know if they're effective?"
5. "What are your thoughts on AI being integrated into educational platforms? Any benefits or concerns?"

**Tailored Questions**

CS Graduate Student (24 years old, full-stack developer)

1. "As both a student and developer, what gaps do you see between educational tools used in university and what could exist?"
2. "What technical considerations do you think are most important when designing AI-enhanced educational tools?"
3. "How might your experience bridging academic and professional environments inform better educational technology design?"

Self-Taught Front-End Developer (28 years old)

1. "How did you navigate finding quality resources during your self-learning journey?"

2. "What would have made your self-directed learning experience better from a design perspective?"
3. "What do you think traditional educational platforms miss about how self-directed learners effectively acquire skills?"

National Bank's Vice Governor (50 years old)

1. "How do you evaluate the effectiveness of training and educational programs in your organization?"
2. "From a leadership perspective, what would make you confident in adopting AI-enhanced learning tools?"
3. "How do you balance technological innovation with practical implementation in your organization's learning programs?"

High School Student (18 years old)

1. "How do you and your classmates currently use technology in your learning process?"
2. "What would make digital educational tools more engaging and useful for you and your peers?"
3. "What digital skills do you think will be most important for your future that you're not learning in school?"

FINKI Student (Computer Science and Engineering)

1. "How do the current educational tools at FINKI support or hinder your learning in computer science courses?"
2. "What challenges do you face when trying to apply theoretical concepts from your courses to practical programming tasks?"
3. "How could AI enhance the learning experience specifically for computer science education and programming skill development?"

**Wrap-Up Question**

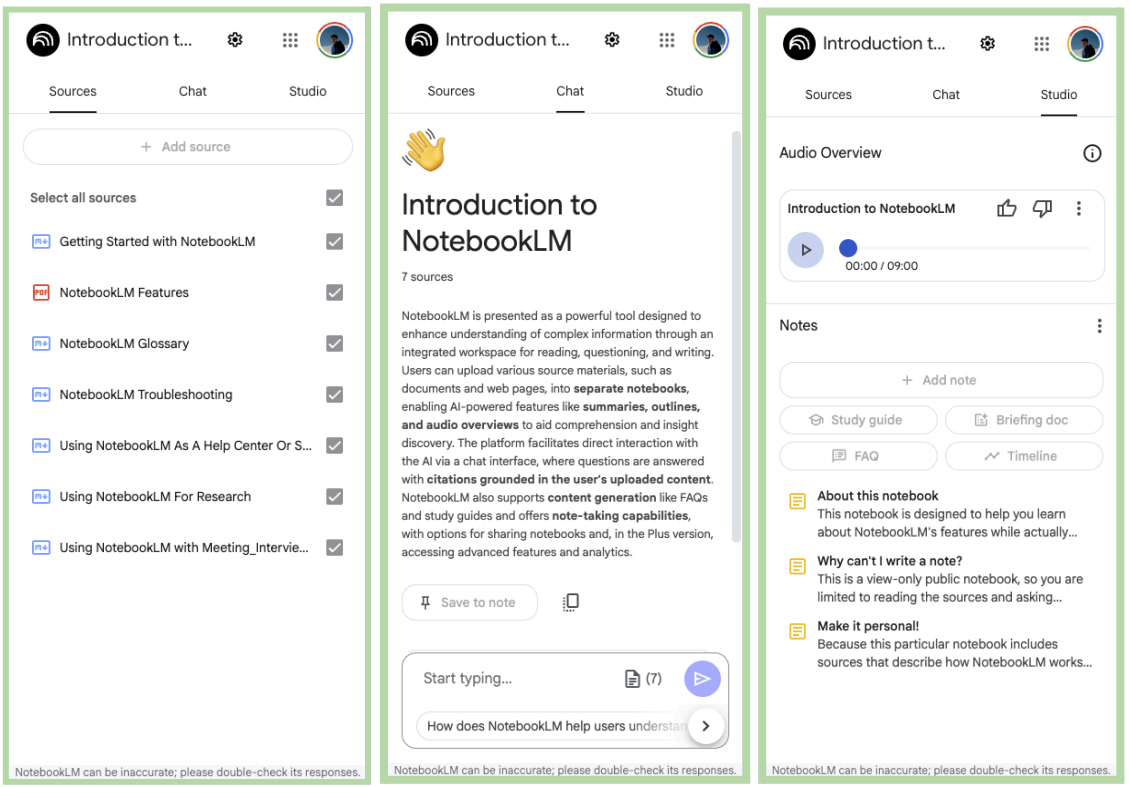
1. "If you could redesign educational technology with AI to better serve your specific needs, what would be the most important change?"

# Similar product research

## 1. Notebook LM

NotebookLM is an experimental AI-first notebook developed by Google that creates a specialized AI based on documents you upload. Unlike general AI tools, NotebookLM remains grounded in your specific materials, analyzing and organizing your content without pulling information from the internet or making up facts. It helps users summarize key points, highlight important sections, answer specific questions, and generate new ideas based solely on uploaded documents. The tool is particularly useful for analyzing dense papers, offering concise summaries, and understanding relationships between different documents on the same topic.

- *Good Features:* Allows users to upload multiple content formats (PDFs, videos, websites) and interact with them to create study guides, timelines, and summaries. It's ideal for processing large amounts of information.
- *Inspirational:* Its ability to generate personalized study resources from diverse inputs is a standout feature for enhancing student learning.
- *Weakness:* Limited to summarization and content generation; lacks interactive or gamified elements.

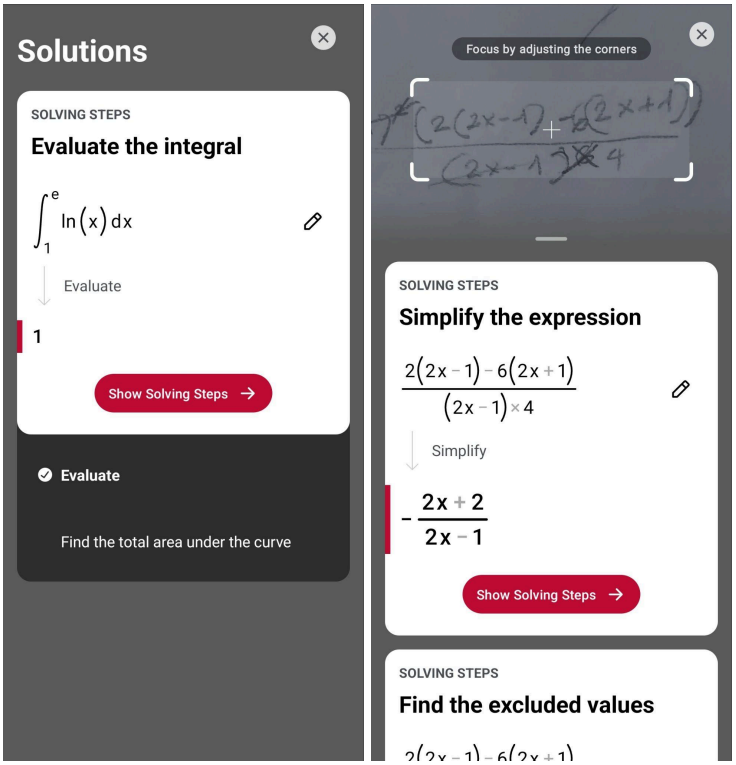



*Notebook LM: Three different screens where you can set sources, chat with the data and hear an audio made for you.*

## 2. Photomath

Photomath is a mobile app that allows users to solve math problems simply by taking a picture of the equation. The app uses AI-powered optical character recognition (OCR) to scan handwritten or printed math problems and provides step-by-step solutions. It supports a wide range of mathematical topics, including arithmetic, algebra, trigonometry, calculus, and word problems.

- *Good Features:* The step-by-step explanations help users understand the problem-solving process rather than just providing an answer. It also includes interactive graphs and multiple solving methods for some problems.
- *Inspirational:* Photomath's ability to bridge the gap between learning and problem-solving makes math more accessible, especially for students struggling with complex equations.
- *Weakness:* The app may not always recognize very messy handwriting, and it struggles with some advanced math concepts that require deeper reasoning rather than formulaic solutions. It also lacks features for verifying answers to word problems beyond basic equation recognition.

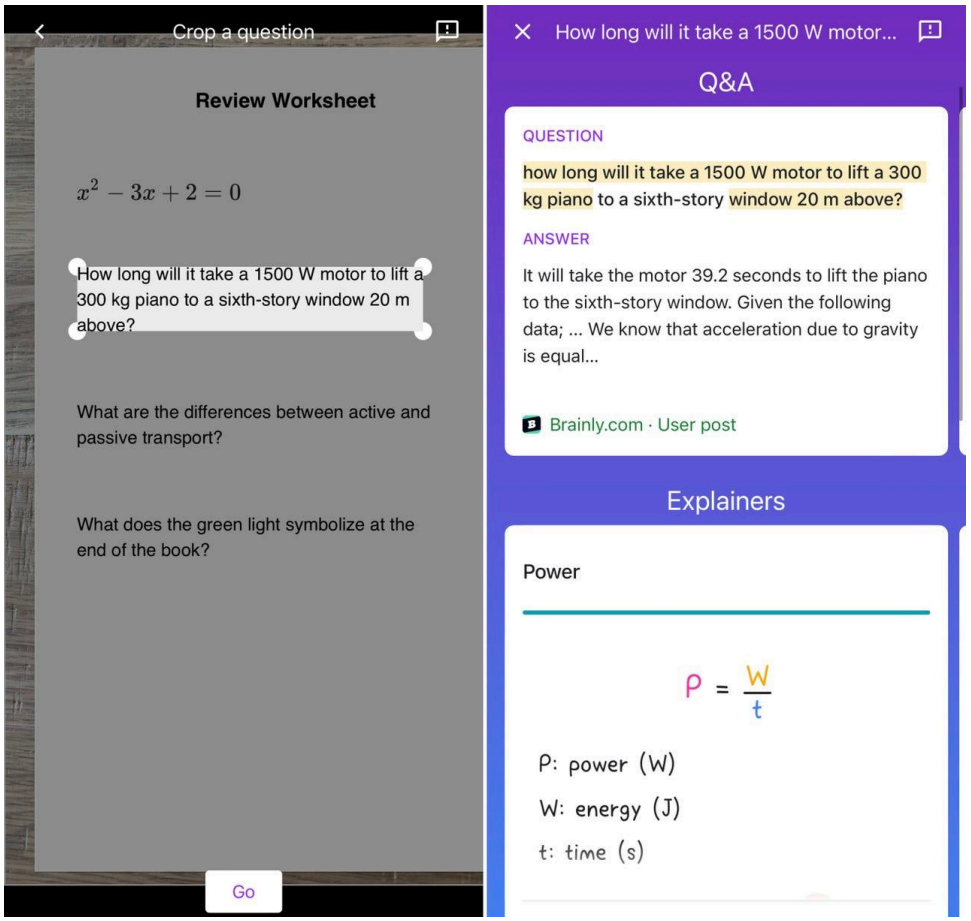



*Photomath: Different types of math questions solvable by Photomath by either typing it or taking a picture of it*

## 3. Socratic by Google

Socratic is an AI-powered learning app acquired by Google in 2018 that helps students with their homework. It allows students to input questions via text, photos, or voice, and then uses AI to analyze the content and provide relevant educational resources. The app breaks down complex concepts into manageable steps, offering explanations rather than just answers. Originally founded in 2013 by Chris Pedregal and Shreyans Bhansali, Socratic has evolved from a community-driven platform for educational videos to a comprehensive homework helper covering subjects like math, science, social science, and humanities.

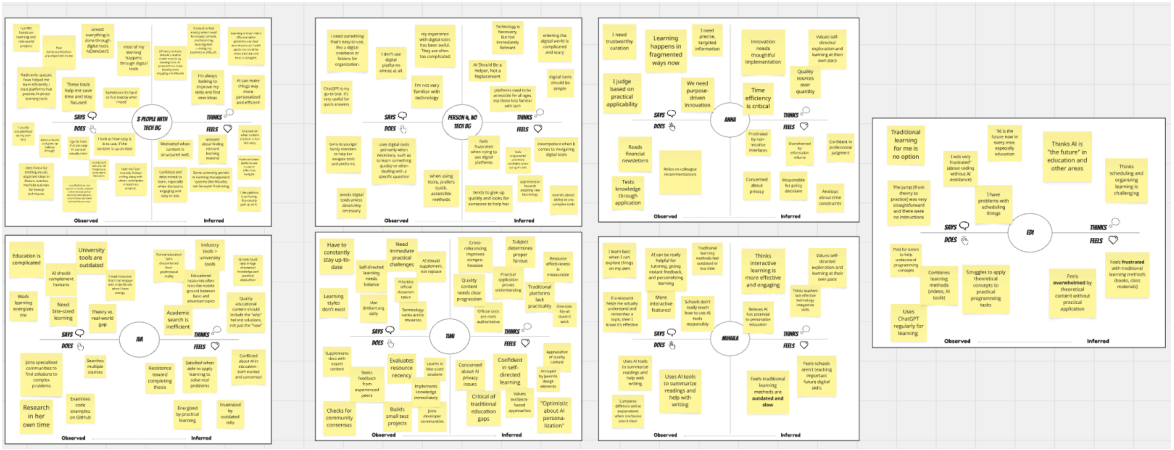
- *Good Features:* Helps students solve homework problems by breaking them down into manageable steps rather than providing direct answers.
- *Inspirational:* Encourages critical thinking by guiding students through the problem-solving process.
- *Weakness:* Limited scope as it primarily focuses on homework assistance rather than broader educational applications.




*Socratic by Google: Taking a picture of a text problem and it being recognized and solved by Socratic*

# Summary of conclusions

## ***STEP 1: Gather all Data***



*Gathering qualitative data from interviewees using the post-it note methodology*

After the interviews, we made a map for each using the post-it template. We did this to better clarify what each interviewee wanted to express and how it would help us summarize or combine the ideas.
We utilized the empathy mapping technique to visually and comprehensively break down each participant's experiences, thoughts, and needs.

The empathy mapping process allowed us to deconstruct the interview data into four critical quadrants:

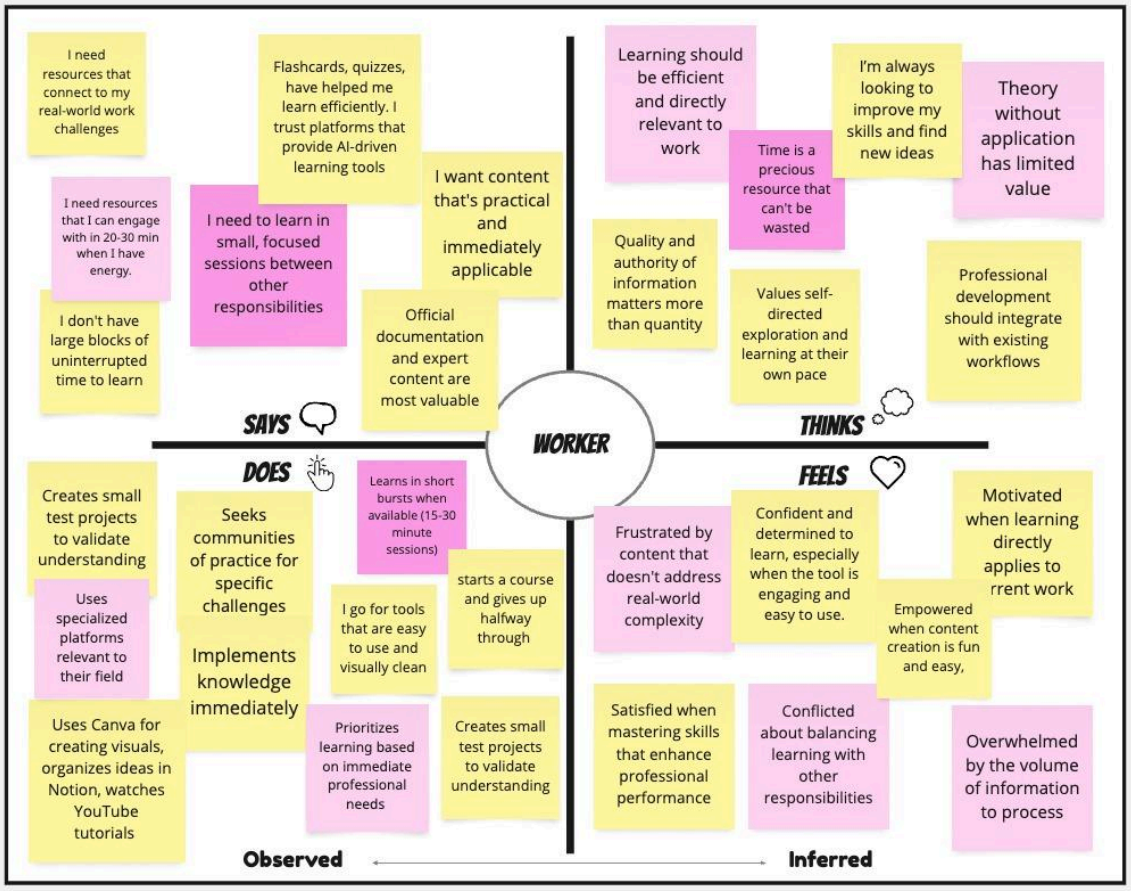
- What the participant *Says*
- What the participant *Thinks*
- What the participant *Does*
- What the participant *Feels*

## STEP 2: Categorize and combine gathered data

We categorized our interviewees into ***four*** distinct personas based on shared characteristics and behavioral patterns

## Persona Groups

- WORKER




Persona Group 1: Professional Learners (Time-Constrained Working Professionals)
*Members: Iva, Timi, Viola, Anna*

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## ***Tensions, Contradictions, and Surprises:***

1. Tension between theory and real-world requirements: While they have formal education, they find much of what they learned academically is not directly applicable to their everyday work needs.
2. Contrast in style of learning: They want to know more deeply but lack sufficient time to have deep learning and need to learn instead in shallow, disconnected ways even though they recognize this is less than ideal.
3. Learning source surprises: Despite their years of professional experience, they tend to rely on social learning sources (social forums, YouTube) and not formal courses on professional development.
4. Individual and group learning tensions: They value knowledge from communities and peer-to-peer learning but do not always make time to actually work together, and thus isolated learning.
5. Contrary in nature requirements: They want both bite-sized, practical content and profound understanding of complex topics - two requirements that are naturally at odds with each other.

## ***User attributes, needs and insights***


*User attributes, needs and insights for WORKER*

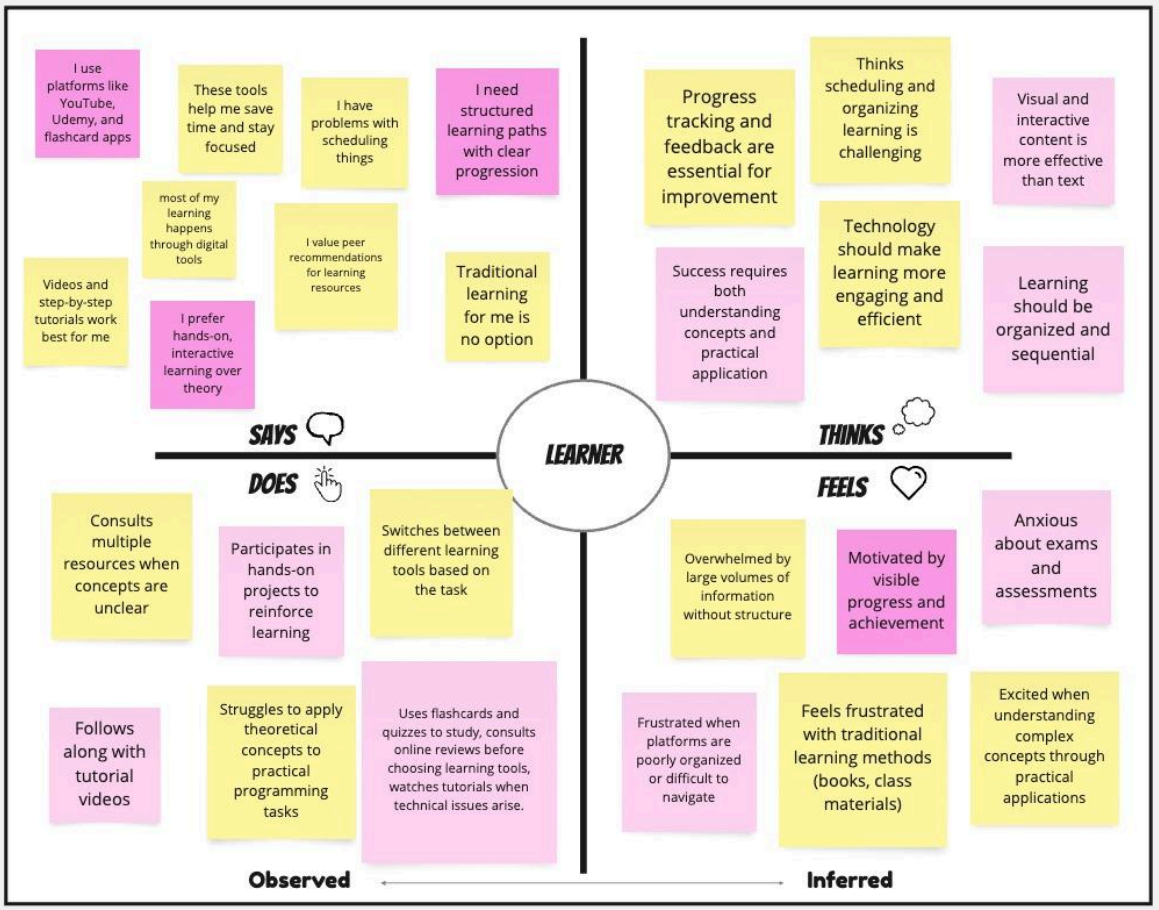
## ***Point Of View***

"**We met** Worker, a work-focused specialist juggling various responsibilities at all times.

**We were amazed to discover** that he gets highly motivated whenever learning can be applied directly to his immediate work problems.

**It would be game-changing to** develop adaptive learning systems that dovetail with their current workflow, providing targeted, bite-sized content that closes the space between theoretical learning and on-the-job applicability."

- LEARNER




Persona Group 2: Formal Education Students

*Members: Edi, Tea, Rigon*

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## ***Tensions, Contradictions, and Surprises:***

1. Contradiction between theory and practice: They are aware of the importance of theoretical knowledge but strongly prefer to learn through doing even when theory can provide more solid foundations.
2. Conflict between guided learning and discovery: They want to learn specific paths but become most interested when given complete freedom to investigate topics.
3. Surprise in tool use: Despite being registered in institutional courses, they rely heavily on informal learning platforms Udemy compared to university-provided resources.

4. Contradiction in evaluation perspectives: They do not like formal evaluations but also depend on them as motivation and confirmation of their learning development.
5. Dilemma between independent pace and structured curriculum: They want to learn at their own pace but appreciate the structure and timelines of traditional schooling.

## ***User attributes, needs and insights***


*User attributes, needs and insights for LEARNER*

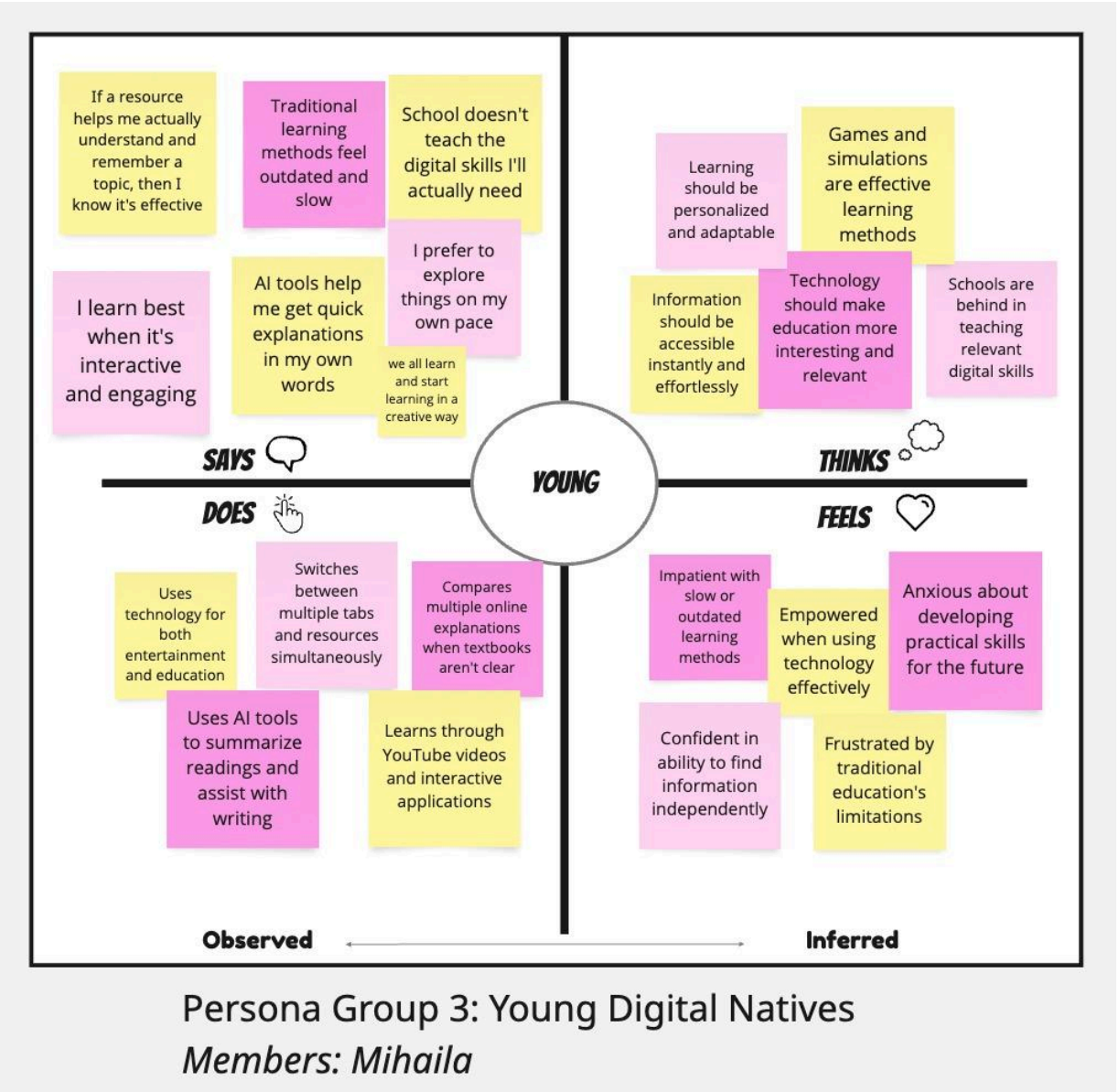
## ***Point Of View***

**"We met** Learner who identifies herself as visual and interactive learner,

**We were amazed to discover** she struggles in traditional education despite being achievement-motivated.

**It would be game-changing** to develop learning tools that seamlessly blend independent study with collaborative experiences, creating an educational ecosystem where theory and practice reinforce each other through compelling visual

- YOUNG:




Persona Group 3: Young Digital Natives

*Members: Mihaila*

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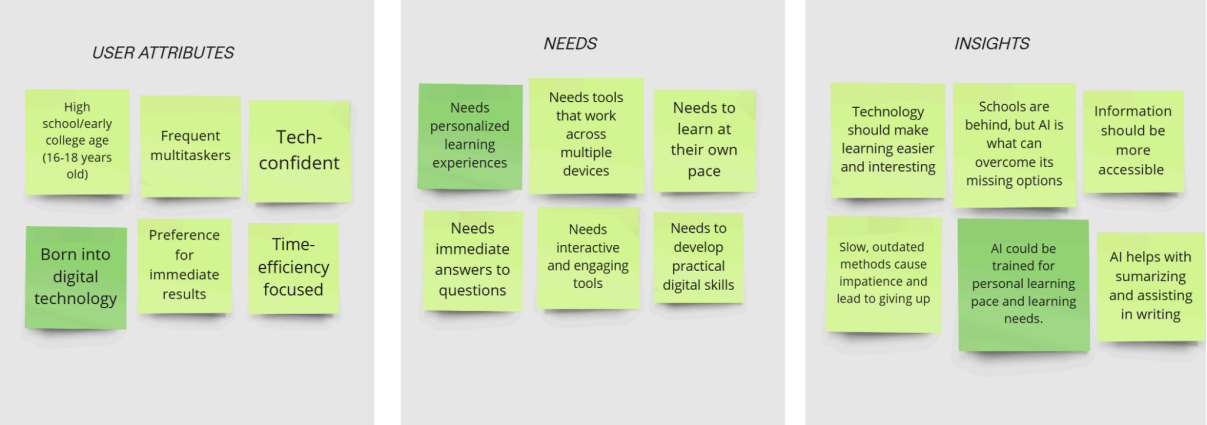
## ***Tensions, Contradictions, and Surprises:***

1. Contrast in attention patterns: They alternate between a number of sources of information rapidly but have difficulty maintaining attention on complex topics.
2. Struggle between immediate gratification and deep learning: They want instant solutions but recognize the value of deeper knowledge, thereby developing an inner conflict.
3. Surprise of AI utilization: Despite anxieties around AI dependency, they fully engage AI tools in their learning process and rely heavily on them.
4. Contradiction in independence of learning: They value learning on their own schedule, yet work actively to win peer approval and social learning.
5. Conflict between school curriculum and perceived "real skills": They receive formal education but simultaneously reject it as unrelated to their upcoming career needs.

## ***User attributes, needs and insights***




*User attributes, needs and insights for YOUNG*

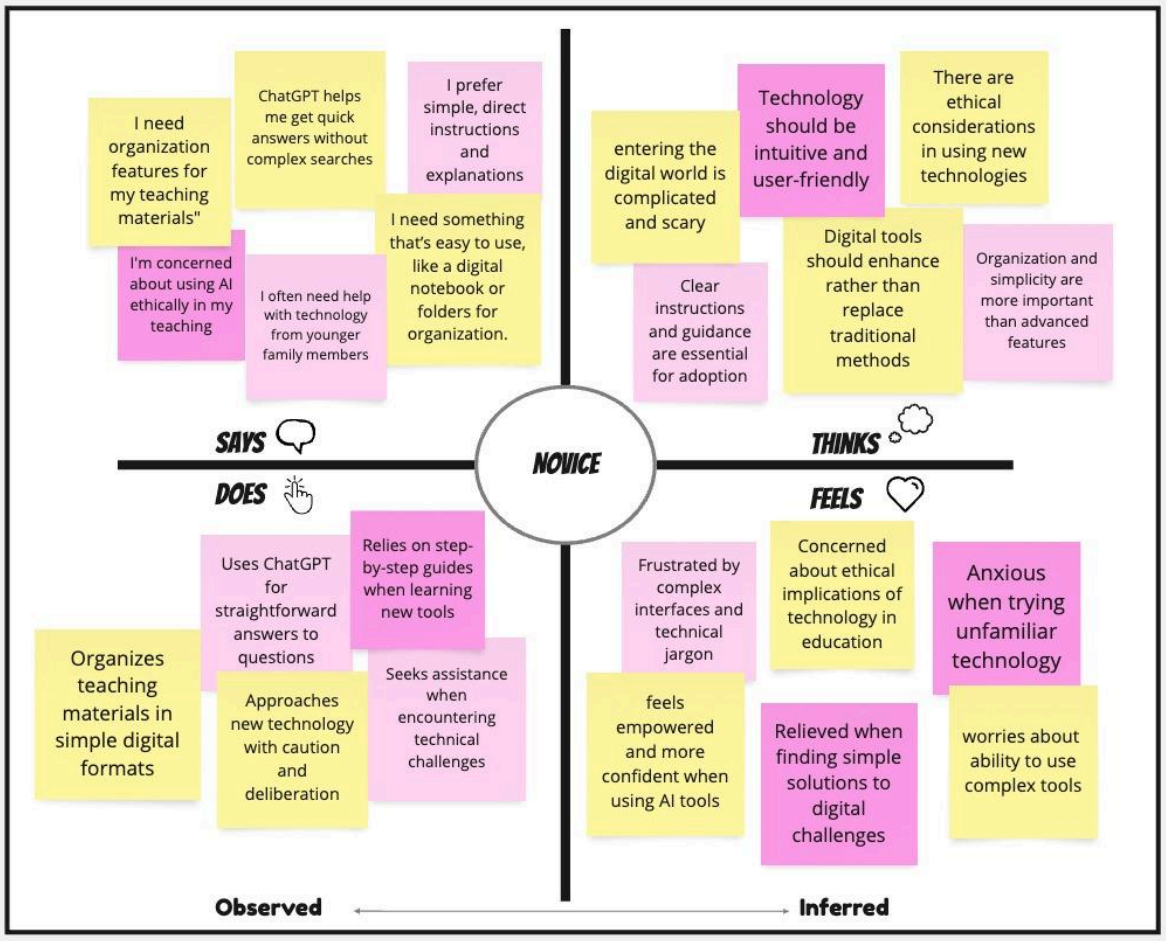
## ***Point Of View***

**"We met** Young, a born-into-digital-technology student who needs personalized learning experiences.

**We were amazed** to discover how AI could be trained to adapt to their individual learning pace and needs.

**It would be game-changing** to develop intelligent educational platforms that overcome the limitations of traditional schooling while providing the personalization, immediacy, and engagement these digital natives expect."

- NOVICE:




Persona Group 4: Digital Newcomers/Late Adopters

*Members: Vlora*

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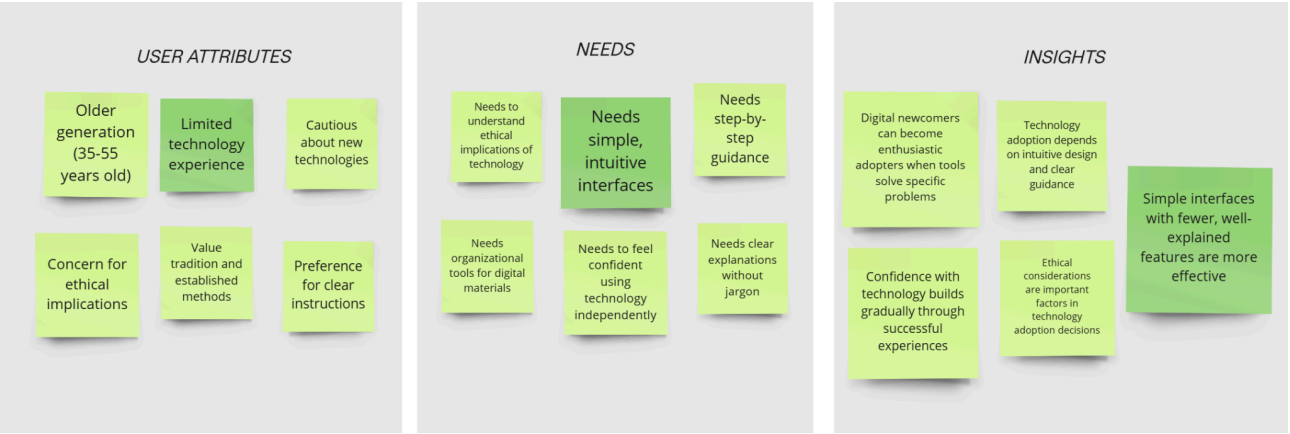
***Tensions, Contradictions, and Surprises:***

1. **Contradiction in technology attitude**: They express skepticism about technology's value in education while simultaneously seeking more digital tools to improve their teaching.
2. **Tension between assistance and independence**: They want to use technology independently but frequently rely on others for help, creating frustration and dependence.
3. **Surprise in AI adoption**: Despite being generally technology-hesitant, they've enthusiastically adopted AI tools like ChatGPT for specific, well-defined tasks.
4. **Contradiction in learning approach**: They prefer traditional, structured learning methods for themselves but recognize the need to embrace new approaches for their students.
5. **Tension between simplicity and functionality**: They want simple, easy-to-use interfaces but also need robust features to accomplish their goals, creating frustration with many digital tools.

***User attributes, needs and insights***




*User attributes, needs and insights for NOVICE*

***Point Of View***

"**We met** Novice, an individual with limited experience with technology who becomes frustrated when using new technology and sometimes gives up hope, therefore needs assistance with it,

**We were amazed to** discover that simple interfaces with fewer, more defined features are much better suited to her.

**It would be game changing to** create digital AI learning tools that breed confidence through experiences of incremental successes, simplicity with no compromise."

## FINAL STEP : Choose  favorite ideas

After the above summarising and categorization, we were able to see more clearly the ‘winning’ ideas for the design concept. Although it is not easy to separate the best ideas, our choice is based on the need and what we concluded was best for the design to satisfy user needs.

- **Organization tools for managing learning materials**
  This will help users organize their studying like in notebooks, so they can keep track of each different learning track they started without them overlapping or mixing up with each other. This could also help with the other idea of personalized learning plan with AI because it will be trained especially for that one learning track.
- **Personalized learning plan with AI**
  This is more of an individual feature, because we concluded that everyone has their own studying pace, their own attention span, different ways of memorizing etc. This  AI feature will help them personally achieve their goals in their own personal ways.
- **Automatically transform uploaded content into preferred learning formats** (summaries, visual maps, flashcards)
  We noticed that people learn better by continuous revising and bullet points mostly help with visual memory in order to remember better. So the best way to do that is by having the option to summarize lectures/contents and create visual maps or flash cards to self-test.

- **Personalized quiz generation and adaptive learning paths**
  After each learning session, AI generates quizzes calibrated to the user's knowledge level, identifies areas for review, and suggests customized next steps Provides users with validation, gives professionals efficient ways to validate understanding. Users can also invite others to collaborate on learning projects with customizable permissions (view, edit, comment), synchronous or asynchronous collaboration, and AI-facilitated division of tasks

- **Personalized motivation system with achievement tracking and rewards**

  Users earn points, badges, and unlock achievements based on consistent learning, milestone completion, and knowledge mastery, with different motivation systems for different user types. Could also include mini games based on user preference. This feature would provide motivation for user through formal validation and encourages confidence and progress by earning rewards.

# Conclusion

Our research for digital learning tools and how users interact with the existing tools helped us find profound insights into the different needs of modern learners across different persona groups. By conducting the interviews and analyzing user experiences, we have highlighted the  critical challenges and opportunities in educational technology. It is also important to mention that enhancing more AI in digital tools is definitely necessary but its more important to mention that its purpose wont be to replace human knowledge and learning but to support and help broaden it in personalized ways based on the user.