Eliciting User Requirements for AI-Enhanced Learning Environments

Using participatory approach

Bibeg Limbu et al.

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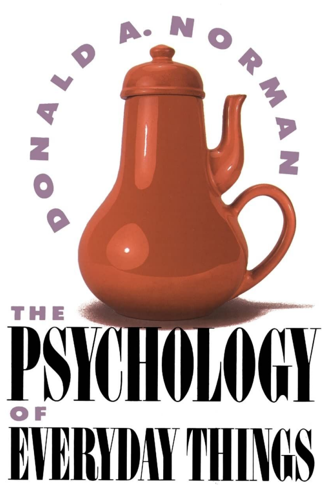
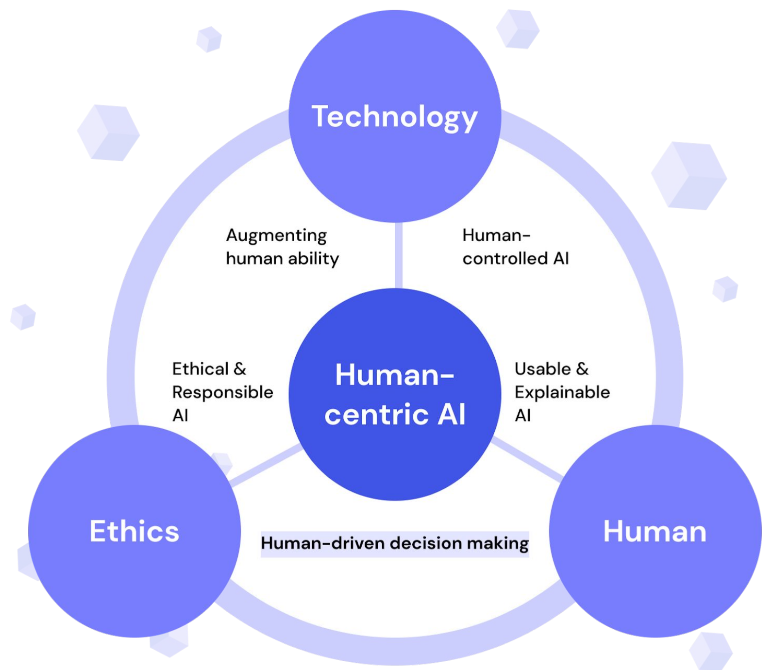
Purpose of the study

To design AI-based solutions that align with human values

- Human-centred AI
- Participatory approaches

“people often misjudge their own needs, preferences, and limitations, especially when it comes to interacting with complex systems or technology”





The Human-Centered AI (HCAI) framework

augMENTOR

Research Questions

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Understand user requirements for design of AI-based solutions

- What are the needs of educators and learners for teaching and learning 21st-century skills?
- What are their expectations of AI technologies for skill development?

Paul Kirschner: "The last major revolution in education was the chalkboard"

Paul Kirschner is Emeritus Professor of Educational Psychology at the Open University (Netherlands). / Photo: courtesy of the author

https://educationalevidence.com/

Participatory Focus group workshops

- Phase 1: needs
- Phase 2: expectation

Step 1

Phase 1 - Introduction to the Project

- Introduce the project to the participants
- Discuss 21st-century skills
- Discuss current practices & challenges around technology and 21st-century skills
- Provision of thoughts and feedback from the participants

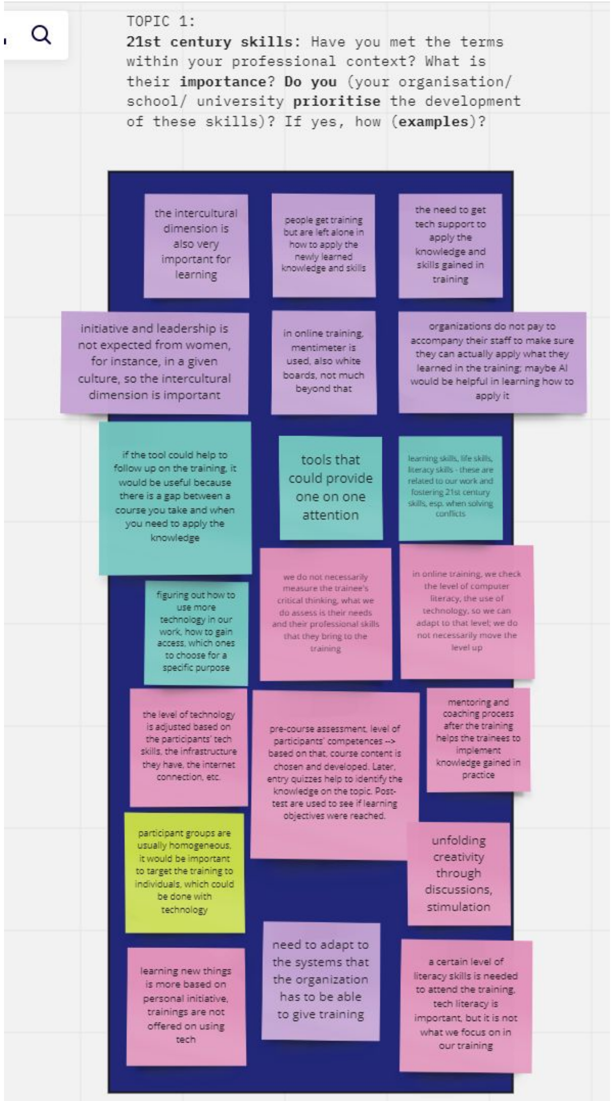
Step 2

Phase 2 - Eliciting requirements for the augMENTOR solution

- Implement the hands-on activity
- Gather information about attributes that should be used to characterize learner profiles
- Gather information about attributes that should be used to characterize an activity
- Elicit, collect, and analyze user requirements

Participants

- Stakeholders from Higher education institutions
- Two higher education institutions (separate workshops)
    - *Kaunas University of Technology*
    - *University of Patras*
- Workshop facilitators wrote structured reports
- Data collection: use of Miro-board Post-its



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Thematic analysis

- Phase-1
  - Deductive analysis
  - Activity Theory
- Phase-2
  - Inductive analysis

Manual analysis

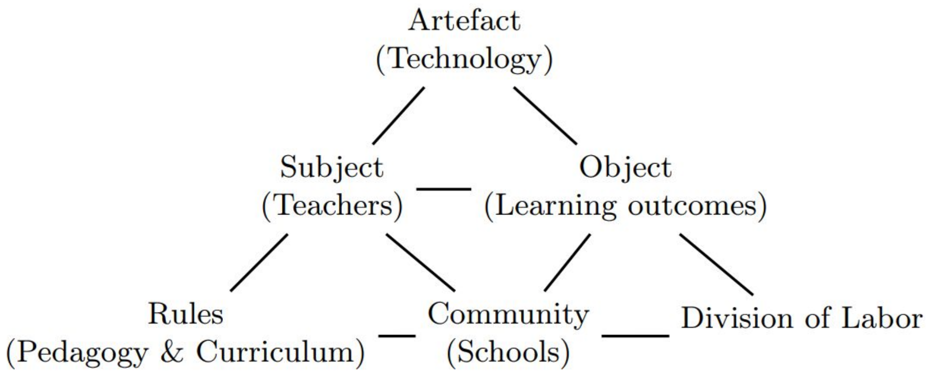


Figure: Activity Theory

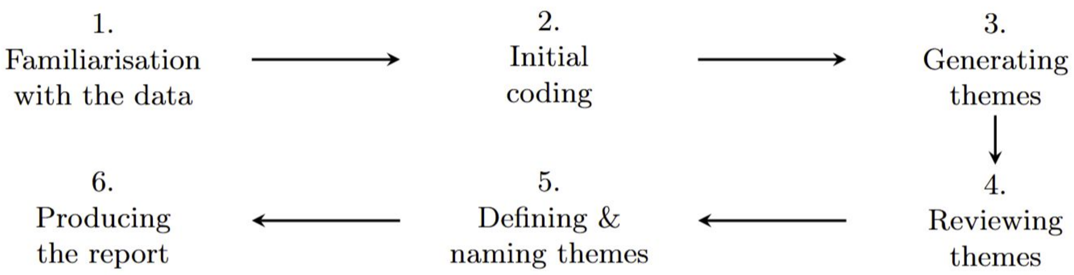
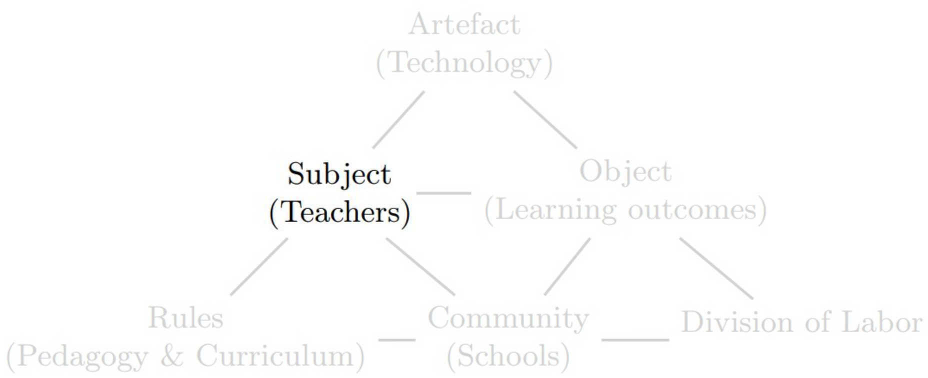


Figure: Thematic analysis steps by Braun & Clarke (2021)

Subjects

The actor who engages in the activity

- Attitudes and beliefs
  - resistance to change
  - distrust in technology
- Pedagogical Preparedness
  - lack of knowledge



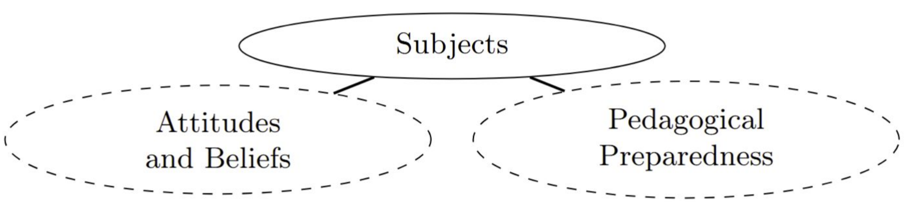


Fig. 4: Themes under the **Subjects** component of AcT

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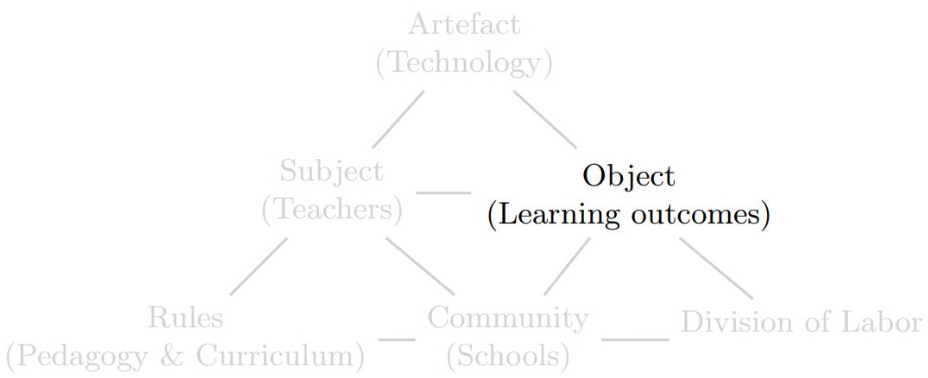
Objects

The goals that the actor wants to achieve (by using the tools)

- Equity in learning
  - individualised support
- Professional development
  - a way to stand out
- Transfer of skills
  - apply what they have learnt



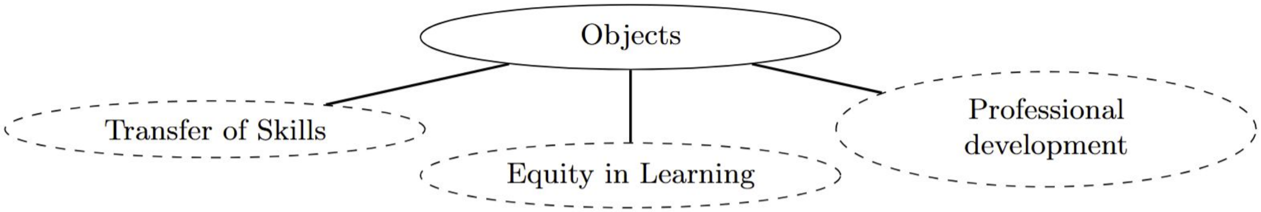
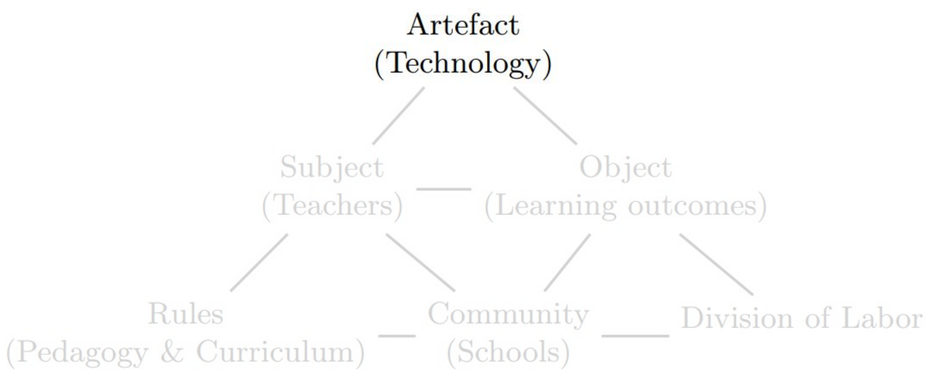


Fig. 5: Themes under the **Objects** component of AcT

Artefacts

The tools (technologies in this instance) that subjects use to achieve their objects

- Adoption challenges
  - lack of guidance
- Desired features
  - task offloading
  - personalisation [Obj: Equity]



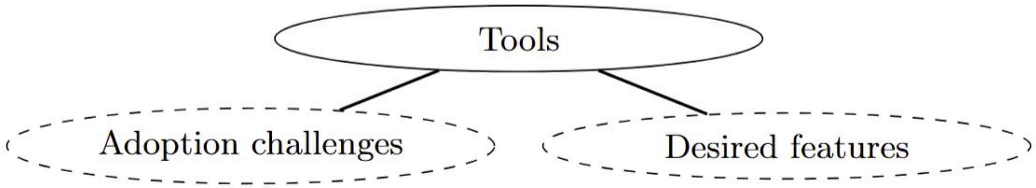


Fig. 6: Themes under the **Tools** component of AcT

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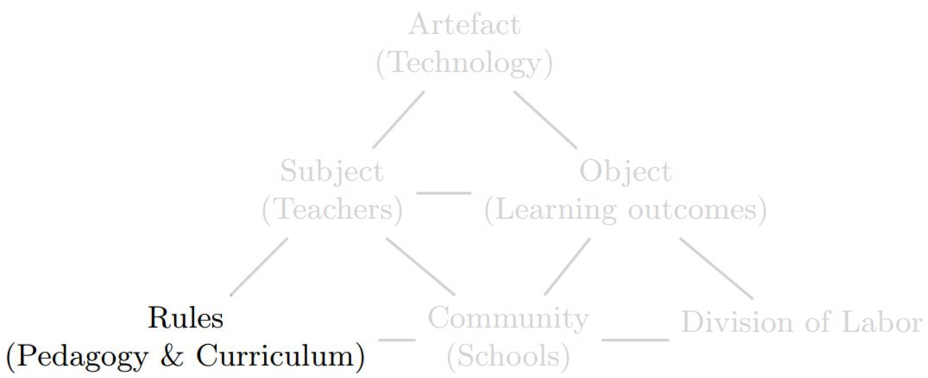
Rules

Policies and norms that regulate the activity.

- Pedagogical norms
  - align with common accepted practices, regardless of pedagogical fit
- Functional norms
  - using technology purely based on its purpose/needs (zoom)
- Institutional and societal norms
  - top-down imposition by the institutions [Community: lack of support}



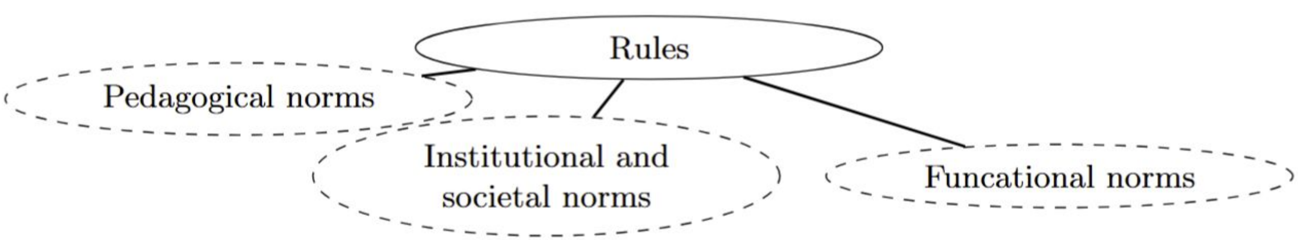
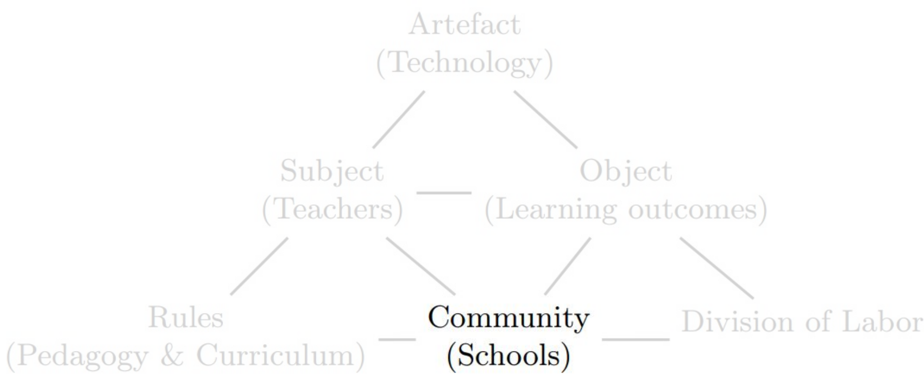


Fig. 3: Themes under the **Rules** component of AcT

Community

Social group(s) or stakeholders who share the object (goal), and influence or are influenced by the activity

- Students and Trainees
  - students' prefer face-to-face learning
- Institutions and organisations
  - teachers are expected and trained but left alone to implement
- Pedagogical researchers
  - researchers produce valuable theoretical insights, but struggle to convey their significance or feasibility.



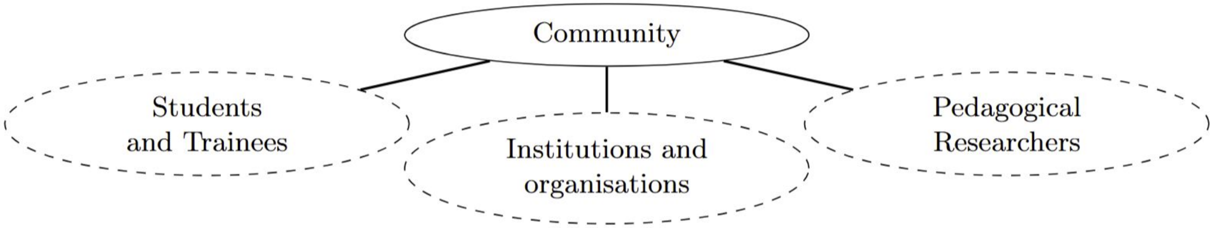
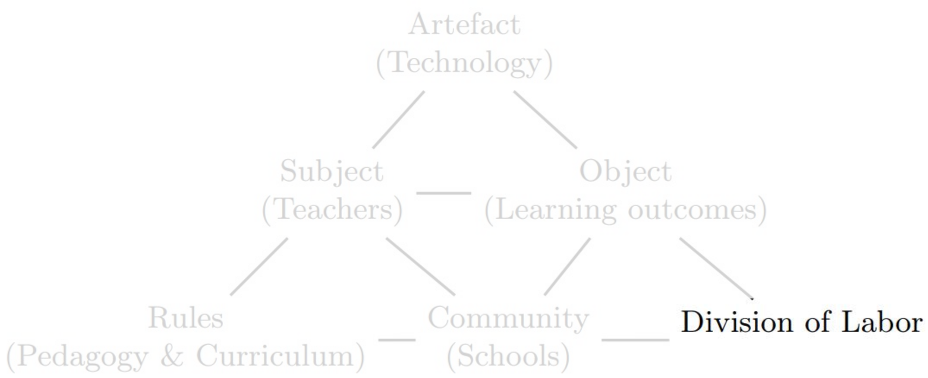


Fig. 8: Themes under the **Community** component of AcT

Division of Labour

The distribution of tasks, responsibilities, and authority among people involved in the activity



- Gaps and Overloads
  - disproportionate share of responsibility toward teachers
- Unclear responsibilities
  - unclear whose role it was to ensure users had the necessary skills
  - whose role to assess AI

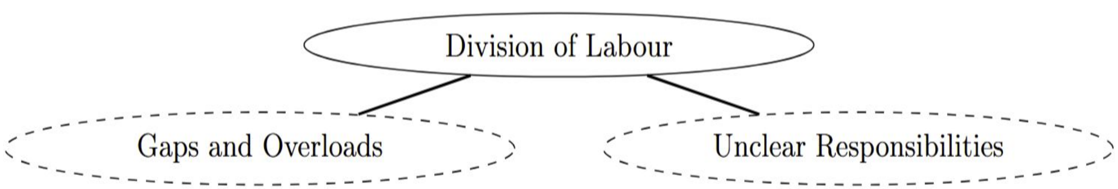


Fig. 9: Themes under the **Division of Labour** component of AcT

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Contradictions

Conflicts in the system

- Researchers recommend Pedagogy and technology but do not offer clear frameworks or guidance, even convince teachers of their significance
- Institutions endorse 21st-century skill frameworks but fall short on practical implementation—offering insufficient training, support, or pedagogical alignment
- Teachers desire AI to offload tasks but distrust AI-driven assessment (*Chounta et. al., 2024*)

Expectations

What the teachers desire

- Adaptive Learning and Personalized Skill Development
  - dynamically adapt content based on learners' characteristics [Objects: Equity in learning]
- Enhancing learner motivation and engagement
  - assist in creating engaging and personalized learning experiences [Artefacts: Desired features]
- Data driven pedagogy design [Subject: Pedagogical Preparedness]
- Feedback in collaborative learning
  - analyzing group contributions
  - provide diverse perspectives to enrich the learning process

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Takeaways

- Strong alignment between what teachers need, and expectation
- Design for the **expansion (of current practice) rather than disruption**
  - Maintain transparency and privacy to earn & maintain trust
  - Adopt hybrid intelligence to clarify the roles of AI and augment the teachers
  - Teacher support beyond the limited training is vital for adoption of technology
  - Institutional supports should go beyond dictating policies.

Limitations of the study

- Limited context, that is, two higher education pilots
- No iterative workshops
- High-level definition of an activity
- Perspective of a teacher
- Data was retrospective

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Thank you,

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