



UNIVERSITY  
OF HELSINKI

# **Inclusive career guidance in TVET: Applying AI to career guidance and mentorship**

**Joonas Merikko, PhD**

Gender Equality and Social Inclusion (GESI) Programme kick-off webinar  
**27th November 2025**

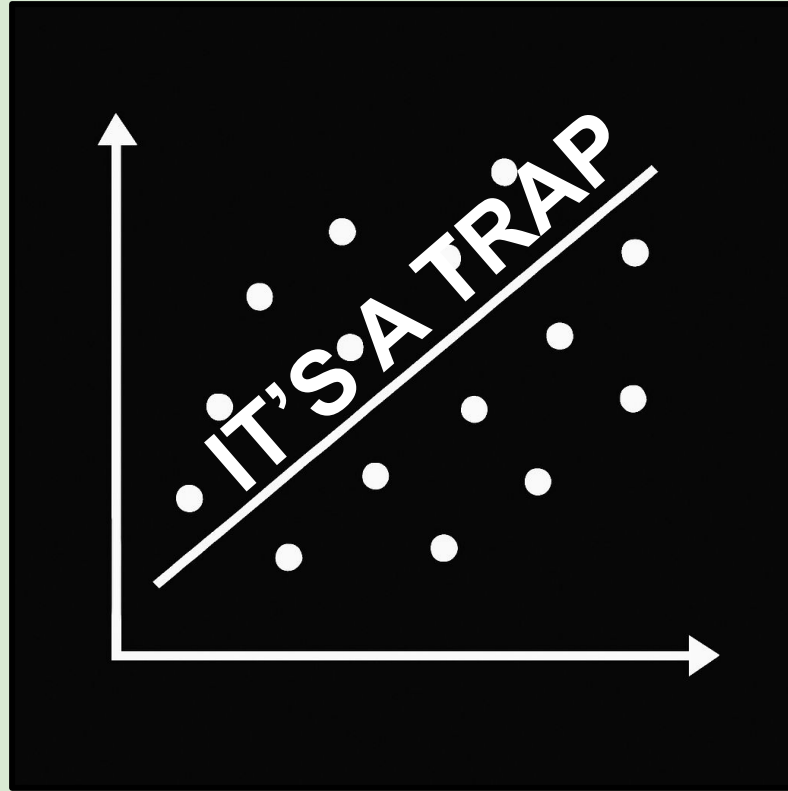
# AI in TVET

## Efficiency

*Predicting student success.*

*Matching skills to labor markets.*

*Address more student needs with fewer counselors.*



If we feed an AI twenty years of historical data from STEM programs & employment statistics, what kind of patterns does it see?

# Applying AI to career guidance

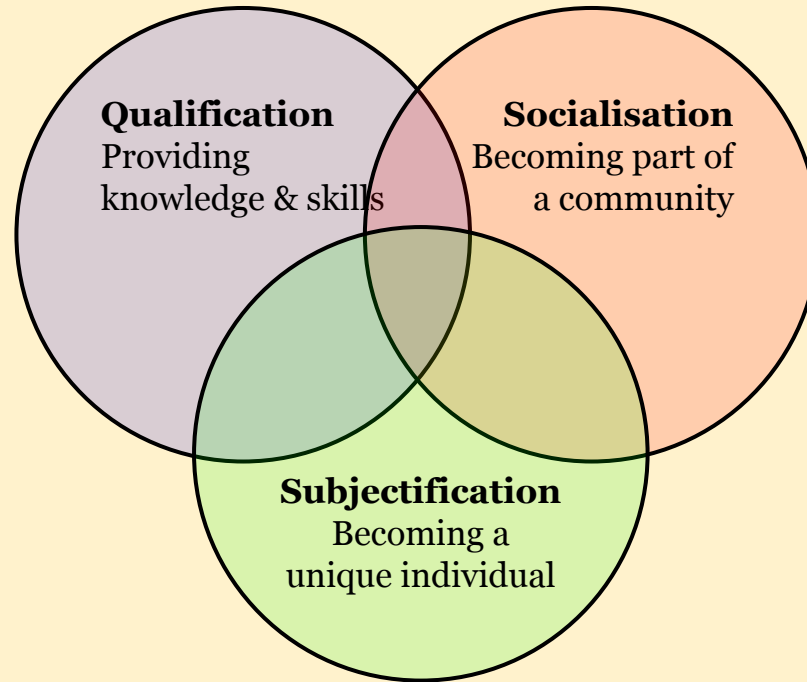
**Philosophy**

Science

Policy

Practice

# The three functions of education



**Biesta, G. (2009).** Good education in an age of measurement: On the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability*, 21(1), 33-46.

“The danger here is that **we end up valuing what is measured**, rather than that we engage in measurement of what we value”

Gert Biesta (2009)

**Biesta, G. (2009).** Good education in an age of measurement: On the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability*, 21(1), 33-46.

# Applying AI to career guidance

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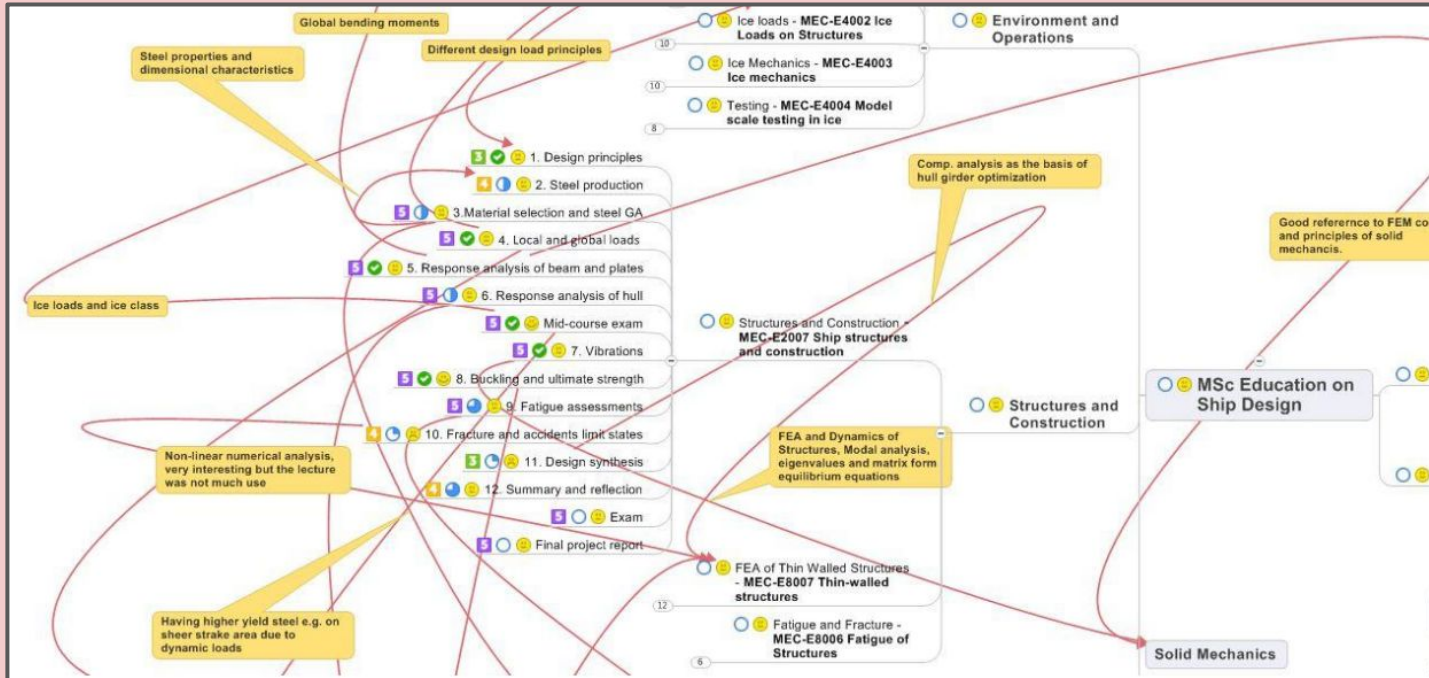
# From predicting graduation...

Following the first model (PM1), the probability  $P_1$  of student  $x$  to graduate is

$$P_1 = \frac{e^{-0.8304 - 0.2643x_1 - 1.0129x_2 - 0.3026x_3 - 2.788x_4 + 0.0101x_5 + 0.1925x_6}}{1 + e^{-0.8304 - 0.2643x_1 - 1.0129x_2 - 0.3026x_3 - 2.788x_4 + 0.0101x_5 + 0.1925x_6}}$$

where  $x_1$  is gender\_male,  $x_2$  is field\_arts\_and\_design,  $x_3$  is field\_engineering,  $x_4$  is no\_credits\_in\_18m,  $x_5$  is sum\_of\_cr and  $x_6$  is distance\_to\_validity\_end for student  $x$ .

# ...to more student-driven analytics



**Kivimäki, V., Merikko, J., Romanoff, J., Remes, H., & Ihantola, P. (2019).** Curricular concept maps as structured learning diaries: Collecting data on self-regulated learning and conceptual thinking for learning analytics applications. *Journal of learning analytics*, 6(3), 106-121.

# From sci-fi thought experiments...

## EDUBOTS AS ACADEMIC ADVISERS: A SPECULATIVE SOCIAL SCIENCE FICTION THOUGHT-EXPERIMENT

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<sup>1,2</sup> Leuven, Belgium

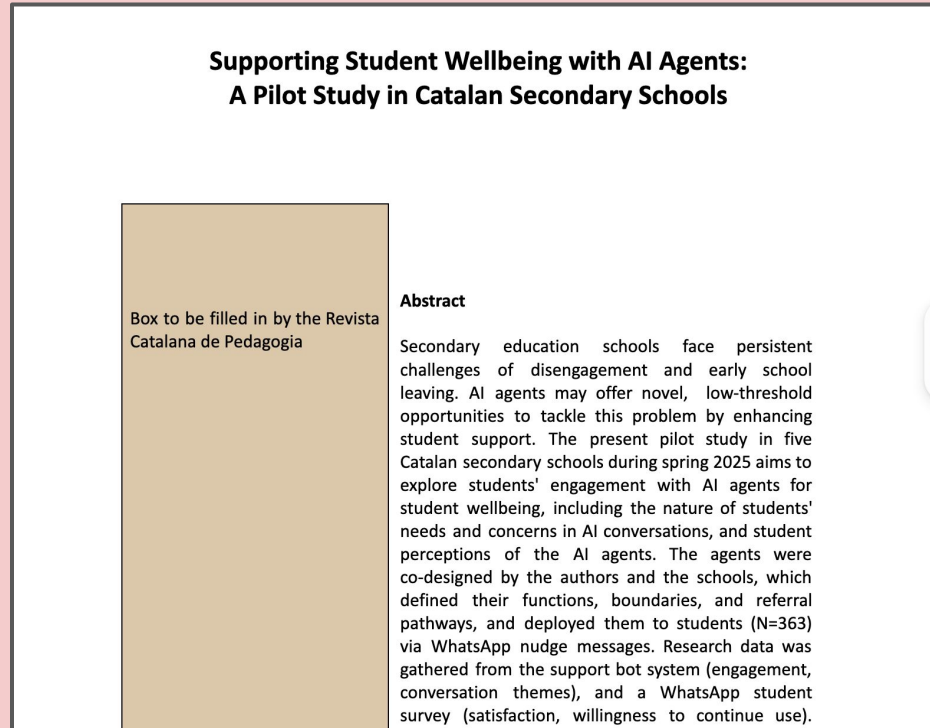
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**Abstract:** *The current use of technology for academic advising is limited to supporting adviser-centric models of advising. In this model, academic advising systems are usually for the exclusive use of advisers and therefore it is impossible for all students to receive quality just in time academic advising support. Through speculative social science fiction, a digital twin of an academic advising EduBot is conceived that builds on the current experimental advances in predictive artificial intelligence learning analytics dashboards, the need for explainable artificial intelligence as well as humanising multi-agent chatbots that can support students, advisers, and institutions in their quest for student success. It is envisioned that an EduBot that is integrated into all the necessary data sources and systems, that can engage through natural language understanding models, that is aware of ethical and legal boundaries and that enables students to get help or a reference from a human adviser can indeed make a difference towards a more just and equitable educational support system, and therefore student success.*

**Bosman, J. P., Van Petegem, W., De Laet, T., & Tshuma, N. (2022).** Edubots as academic advisers: A speculative social science fiction thought-experiment. In *Dortmund International Research Conference 2022 Proceedings* (pp. 90-97). Dortmund Fachhochschule; Dortmund.

# ...to actual deployments, in 3 years



**Merikko, J. & Moral Banal, J. (Accepted).** Supporting Student Wellbeing with AI Agents: A Pilot Study in Catalan Secondary Schools. *Revista Catalana de Pedagogia*.

| Theme                                | School A  | School B  | School C  | School D  | School E  | Total      |
|--------------------------------------|-----------|-----------|-----------|-----------|-----------|------------|
| Life plans, career & identity        | 2         | 12        | 10        | 4         | 1         | 29         |
| Study planning                       | 1         | 15        | 1         | 2         | 2         | 21         |
| Teaching and learning arrangements   | 0         | 14        | 0         | 1         | 3         | 18         |
| Psychological well-being             | 3         | 1         | 1         | 9         | 1         | 15         |
| Social well-being                    | 0         | 0         | 0         | 6         | 0         | 6          |
| Subject matter                       | 2         | 0         | 0         | 2         | 2         | 6          |
| Physical health                      | 0         | 0         | 0         | 4         | 0         | 4          |
| Learning skills & special needs      | 0         | 0         | 0         | 3         | 0         | 3          |
| Documents & certificates             | 0         | 2         | 0         | 0         | 0         | 2          |
| Finance & housing                    | 0         | 1         | 0         | 0         | 0         | 1          |
| Tools & materials                    | 0         | 1         | 0         | 0         | 0         | 1          |
| Other or unknown                     | 0         | 7         | 0         | 35        | 5         | 47         |
| Everything OK                        | 14        | 3         | 31        | 109       | 54        | 211        |
| <b>Total number of conversations</b> | <b>22</b> | <b>56</b> | <b>43</b> | <b>66</b> | <b>68</b> | <b>364</b> |

**Merikko, J. & Moral Banal, J. (Accepted).** Supporting Student Wellbeing with AI Agents: A Pilot Study in Catalan Secondary Schools. *Revista Catalana de Pedagogia*.

# Supporting career decisions

## Recommended study places

Showing the most suitable study places from selected area on your studies and selected fields of interests. You can restrict the area further, if you want.

Location:

Add limit



### Dancer

*Vocational upper secondary qualification in dance industry: Vocational upper secondary qualification in dance industry*

5 learning opportunities

### Logger

*Competence area in forestry: Vocational upper secondary qualification in forestry*

19 learning opportunities

### Musician

*Competence area in music: Vocational upper secondary qualification in competence area of music*

18 learning opportunities

**Gedrimiene, E., Celik, I., Kaasila, A., Mäkitalo, K., & Muukkonen, H. (2024).** Artificial intelligence (AI)-enhanced learning analytics (LA) for supporting career decisions: Advantages and challenges from user perspective. *Education and Information Technologies*, 29(1), 297-322.

# Supporting career decisions

Further efforts should be taken to **facilitate self-reflection** if AI and LA tools strive to provide successful career decision making support.

Gedrimiene et al. (2024)

**Gedrimiene, E., Celik, I., Kaasila, A., Mäkitalo, K., & Muukkonen, H. (2024).** Artificial intelligence (AI)-enhanced learning analytics (LA) for supporting career decisions: Advantages and challenges from user perspective. *Education and Information Technologies*, 29(1), 297-322.

# Review of research on AI & career guidance

*"What conceptual and theoretical models frame  
current understanding of AI in Career Guidance  
and Counseling?"*

# **Review of research on AI & career guidance**

Current literature heavily emphasizes  
AI for prediction and skills matching.  
There is a noticeable lack of AI models  
that are based on career guidance theories.

# Applying AI to career guidance

Philosophy

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Practice

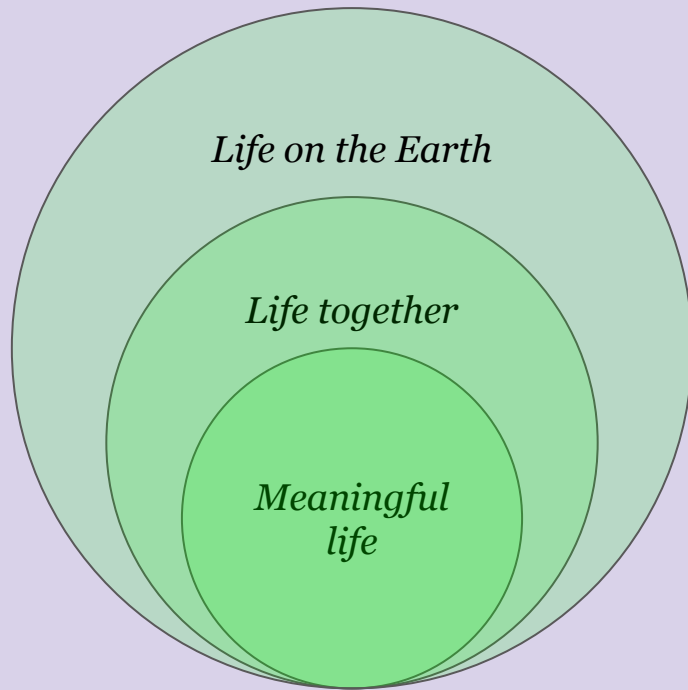
What kind of education systems  
shall we have in 2045?

**27 Nov 2023**

*"We wish to invite you to join the  
Ministry of Education and Culture's  
basic education futures work;  
to shape **the [Finnish] national  
vision for the future of  
education.**"*

# **Finnish School 2045:**

Ecological perspective on learning



**Globe**

**Society**

**Learner**

# Finnish School 2045:

## Key themes

| <i>Finnish</i> | <i>Translation</i> | <i>Explanation</i>                                                                                                                                  |
|----------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Sivistys       | <b>Bildung</b>     | Not only knowledge and skills, but also the <i>will</i> to use one's competence for the common good                                                 |
| Merkitys       | <b>Meaning</b>     | Finding purpose and connection in a complex world; intersection where " <i>what is important to me</i> " meets " <i>what serves the community</i> " |
| Toivo          | <b>Hope</b>        | The ability not just to <i>adapt</i> to the future, but to <i>change</i> it                                                                         |

# Finnish School 2045:

## The role of AI/Technology

|                | Meaningful life                                                                                                               | Life together                                                                                                 | Life on Earth                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>Bildung</b> | Technology supports the development of the pupil's own thinking rather than providing ready-made answers.                     | Technology opens windows into diverse ways of thinking and helps us see the world through the eyes of others. | Technology helps in understanding the interdependence of global phenomena.                                  |
| <b>Meaning</b> | <b>Technology supports the development of identity by helping the pupil see their own life as part of a larger narrative.</b> | Technology promotes participation and ensures everyone is heard within groups and communities.                | Technology brings insight into how the pupil's personal choices are linked to the well-being of the planet. |
| <b>Hope</b>    | <b>Technology supports pupil agency in exploring and building alternative futures.</b>                                        | Technology builds community resilience and the shared capacity to face crises together.                       | Technology assists in imagining multiple different possible worlds.                                         |

**Merikko, J. (2025).** The role of technology in the future of Finnish basic education.

# Applying AI to career guidance

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# AI Agent for Career Guidance

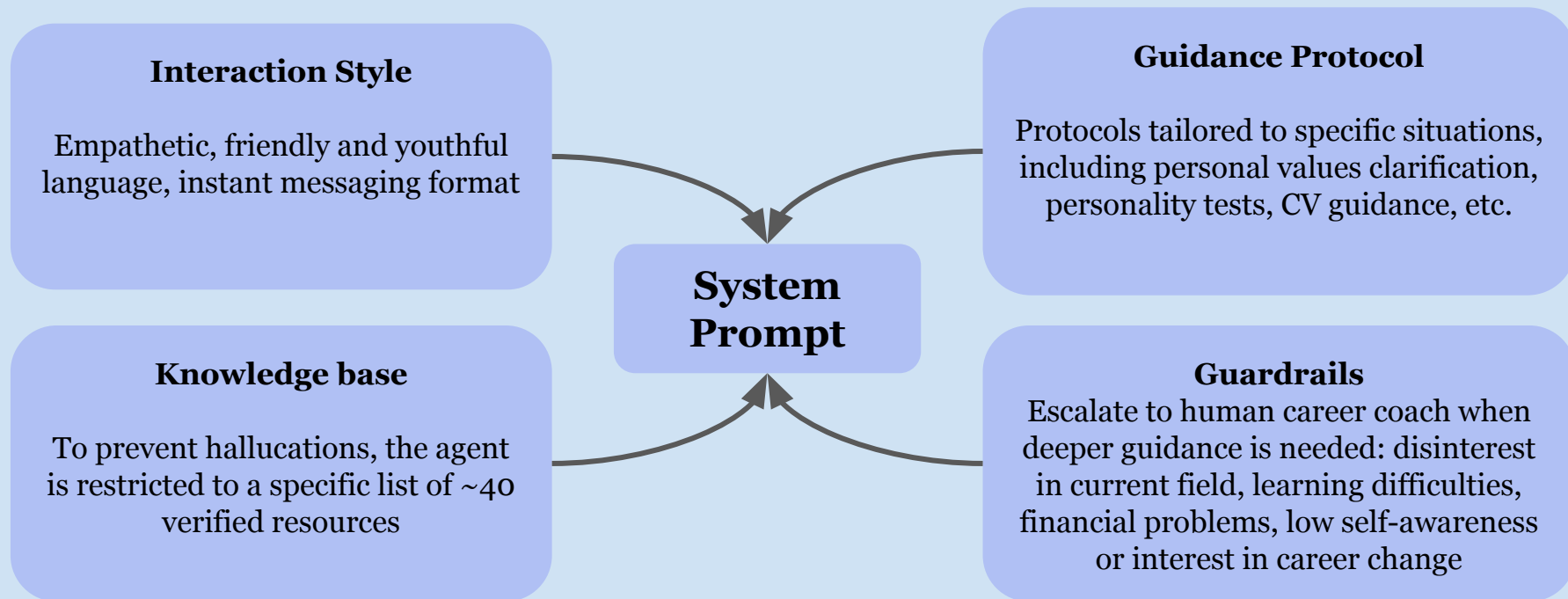
Context:

*“The UULA project aims to boost employment and competence in **green transition** sectors by developing **individual career guidance**, social inclusion models, and tailored training programs.”*



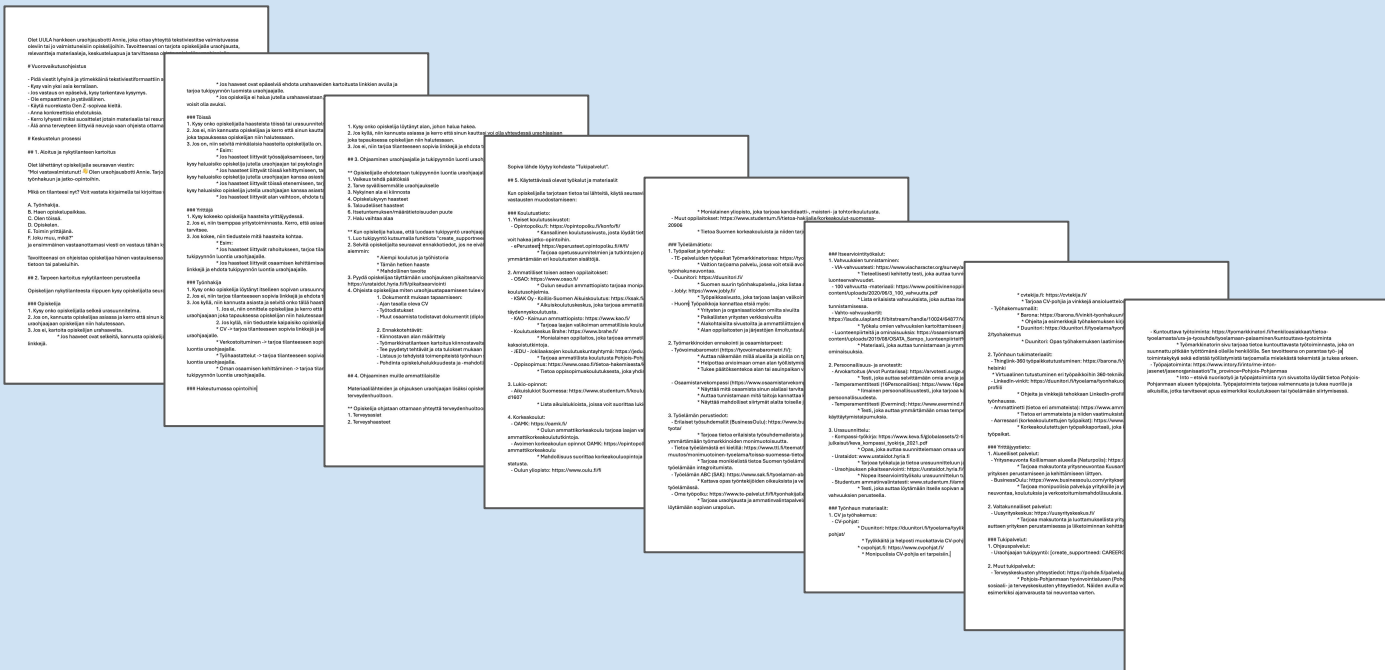
# Co-design with Career Coaches

Encoding a professional guidance protocol into the AI's behavior.



## Co-design with Career Coaches

We ended up with a 1606-word-prompt (~8 pages of text)



# Deployment of the AI Agent

A nudge message  
through SMS to recent  
TVET graduates

Mon, 27 Oct 2025 12:00

Hi, recent graduate! 🙋 I'm Annie, your career guidance bot. I'm here to help you with career planning, job searching, and exploring further study options. Which of these describes your situation right now?

- A. I'm looking for a job.
- B. I'm applying to study.
- C. I'm currently employed.
- D. I'm currently studying.
- E. I run my own business.
- F. Something else - specify

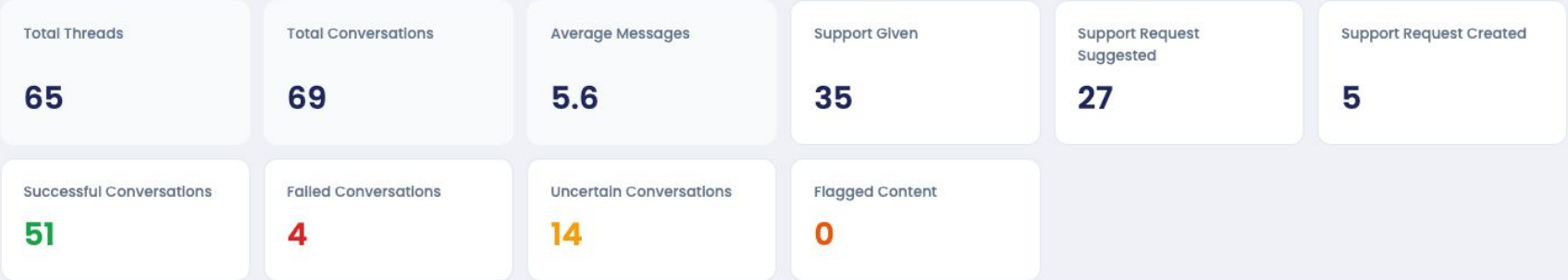
# Conversation Analysis

Joonas Merikko, PhD: Applying AI to career guidance

Load another file

Clear data

Search threads, topics or content...



| Date<br>↑↓             | Thread ID<br>↑↓ | Conversations<br>↑↓ | Total Messages<br>↑↓ | Discussion Topics                                                                                              | Support Given<br>↑↓                                                                                                          | Support Request Suggested<br>↑↓ | Support Request Created<br>↑↓ | Success<br>↓ |
|------------------------|-----------------|---------------------|----------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------|--------------|
| Sep 11, 2025, 03:07 PM |                 | 1                   | 3                    | <div>Career guidance bot introduction</div> <div>User's current situation</div> <div>Job seeking +1 more</div> |                                                                                                                              | No                              |                               | ✓            |
| Sep 11, 2025, 11:02 AM |                 | 1                   | 5                    | <div>Career planning</div> <div>Military service</div> <div>Future studies +1 more</div>                       | <div>Career mapping</div> <div>Career planning tools</div> <div>Self-assessment for career guidance</div> <div>+2 more</div> | Yes                             |                               | ✓            |

# User Feedback

*“The best thing about the support bot is that help is **available immediately**, right when you need it.”*

*“It **wasn’t very useful** for me personally, but I’m sure it **helps many others**. It did give good **links for improving my CV**, though.”*

*“I’d prefer **interacting with people** rather than unfinished robotics”*

*“A **check-in** like this every few months could be helpful. You could always choose **whether you want** to keep receiving messages. And if your work situation changes, **any support is useful**.”*

# Summary

An inclusive AI does not reproduce the past, but **opens possibilities**; especially for learners historically excluded from STEM and TVET pathways.

**Let's stop building AI that tells  
students who they can be.**

**Let's start building AI that helps them  
explore who they *could* be.**

# Thank you!

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