

# PATH TO PERSONALIZATION: A SYSTEMATIC REVIEW OF GENAI IN ENGINEERING EDUCATION

Rubaina Khan

Sreyoshi Bradulji

Tammy Mackenzie

Animesh Paul

Sankalp KJ

Indrani Sen



# THE REVIEW TEAM



**Rubaina Khan**

University of  
Toronto  
Canada



**Animesh Paul**

University of  
Georgia  
Athens, Georgia,  
USA



**Sreyoshi Bhaduri**

Amazon  
Arlington, Virginia,  
USA



**Sankalp KJ**

University of South  
Carolina  
Columbia, South  
Carolina, USA



**Tammy  
Mackenzie**

The Aula  
Fellowship  
Quebec, Canada



**Indrani Sen**

Georgia Tech  
Seattle,  
Washington, USA

# LARGE SCALE TRANSFORMATIONS

Engineering Education in the news

## Smith Engineering is transforming engineering education at Queen's

\$100 million donation from alumnus Stephen Smith catalyst of change

### WHITE PAPER **ENGINEER OF THE FUTURE**

ENGINEERING EDUCATION AT UNIVERSITIES OF SCIENCE & TECHNOLOGY IN EUROPE TO TACKLE GLOBAL CHALLENGES

Leuven, 23 April 2024

June 24, 2024

Olin Named Princeton Review Best Value College for 2024 in its 20th annual list of rankings.

According to the report, the 2024 list of Best Value Colleges all share three exceptional features: stellar academics, affordable cost, and strong career prospects for graduates.

**From Industry to Academia: Aurora Employees Support MIT's NEET Experiential Learning Program**

March 27th, 2023

# SO, WHAT DO OUR STUDENTS NEED TO TACKLE GLOBAL 21<sup>st</sup> century and transversal skills

- Learning how to learn
- Making
- Discovering
- Interpersonal skills
- Creative thinking
- Systems thinking
- Computational thinking
- Experimental
- Humanistic
- Personal skills and attitudes
- Critical and metacognitive thinking
- Analytical thinking



## Activity: The Good, the Bad and the Ugly

In your past you have worked in teams of some form.

- 1) What are some characteristics of a good team? How were they formed in your past teams?
- 2) What are some characteristics of a bad team? How can you avoid them in this team?

## Activity: The Good, the Bad and the Ugly

In your past you have worked in teams of some form.

- 1) What are some characteristics of a good team? How were they formed in your past teams?
- 2) What are some characteristics of a bad team? How can you avoid them in this team?

# WHAT IS UNIQUE IN ENGINEERING EDUCATION (EE)?

EE institutes must ensure that their graduates have the **technical skills** to develop products and processes embedded in complex systems that work seamlessly.

Engineers learn to create systems with **sustainable mindsets** and use **ethical design methodologies**.

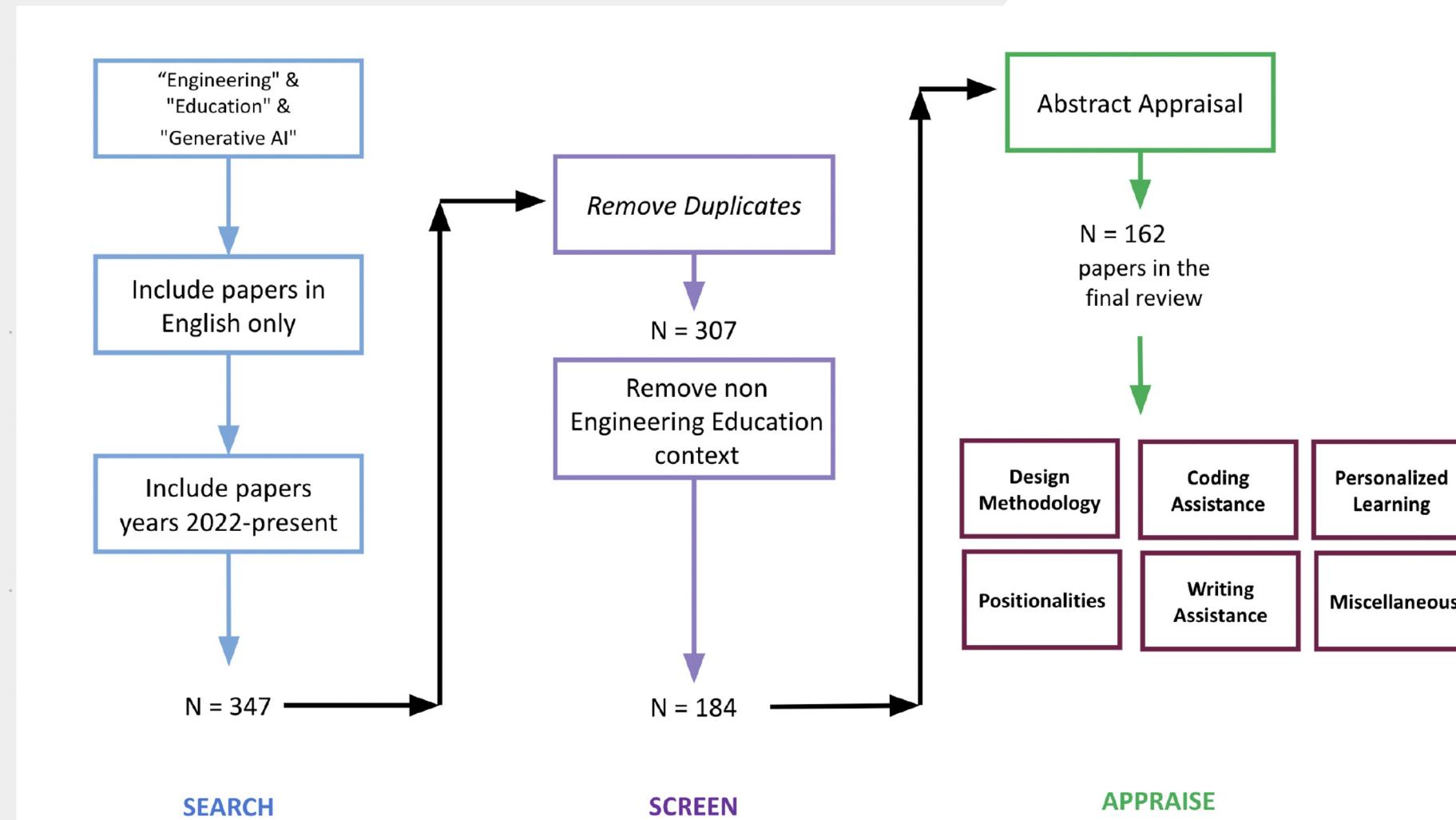
Engineering programs are often **accredited** by governing bodies that emphasize certain skillsets and inform curriculum expectations.

**Design and innovation** are central to engineering education. Design thinking allows students to understand the value of engineering work in society.

EE often spans multiple disciplines and sets graduates up for **interdisciplinary** work.

Engineers are **expected to keep up** with new technology, methodologies, and regulations throughout their careers.

# METHODOLOGY





# FINDINGS

Coding  
Assistance  
(45)

Design  
Methodolog  
y (39)

Position  
Statements  
(33)

Personalization  
(21)

Writing  
Assistance  
(7)

Miscellaneou  
s (17)

# WHAT DID WE NOTICE

*Path to Personalization is currently **reactive** to industry and lacks clear customer needs.*

Engaging learning scientists to **characterize** how 21st-century skills develop, the development of future GenAI tools will offer personalized pathways that are memorable, inclusive, and encouraging learning experiences.

*Path to Personalization will need to be paved with increased **transparency**.*

Clearer indications from academia and associated AI researchers of how student data was collected ethically and processed using transparent methods would allow **applications to flourish** among educators.

# WHAT DID WE NOTICE

*Path to Personalization will require instructor training and resources to help **democratize** the use of GenAI across classrooms,*

On a **curriculum level**, personalized learning systems may track and guide individual students to leverage their strengths as they start a new design experience and recommend curricular and supplementary materials to address their weaknesses.

*Path to Personalization will need to emphasize **value-driven** design.*

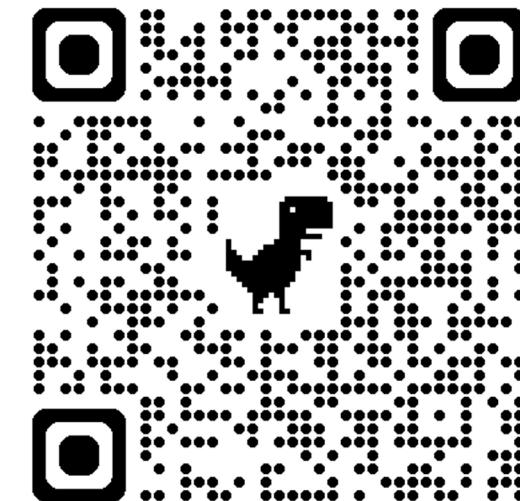
Developers of GenAI tools did not specify the values that motivated their research efforts that could **tackle key issues** in postsecondary education, such as well-being, inner development, and inclusion.

# LET'S KEEP IN TOUCH

Rubaina Khan

[rubaina.khan@mail.utoronto.ca](mailto:rubaina.khan@mail.utoronto.ca)

[www.linkedin.com/in/rubainakhan](https://www.linkedin.com/in/rubainakhan)



Read our paper here!

