



# Understanding students' learning needs for coaching in Industrial Design



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# Agenda

- Introduction
- Educational model ID
- Theoretical Background
- Methods
- Results
- Conclusions
- Recommendations for practice and research

# Introduction

Engineers/Designers of the future

Life long learners

Responsible engineers

T-shaped engineers

Individual Learning paths

Students as active agents of learning

## Design/Challenge-based Learning

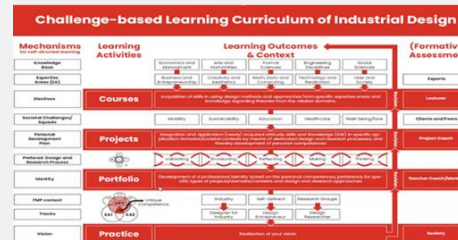
Course level BC



Course level GS



Curriculum level in ID



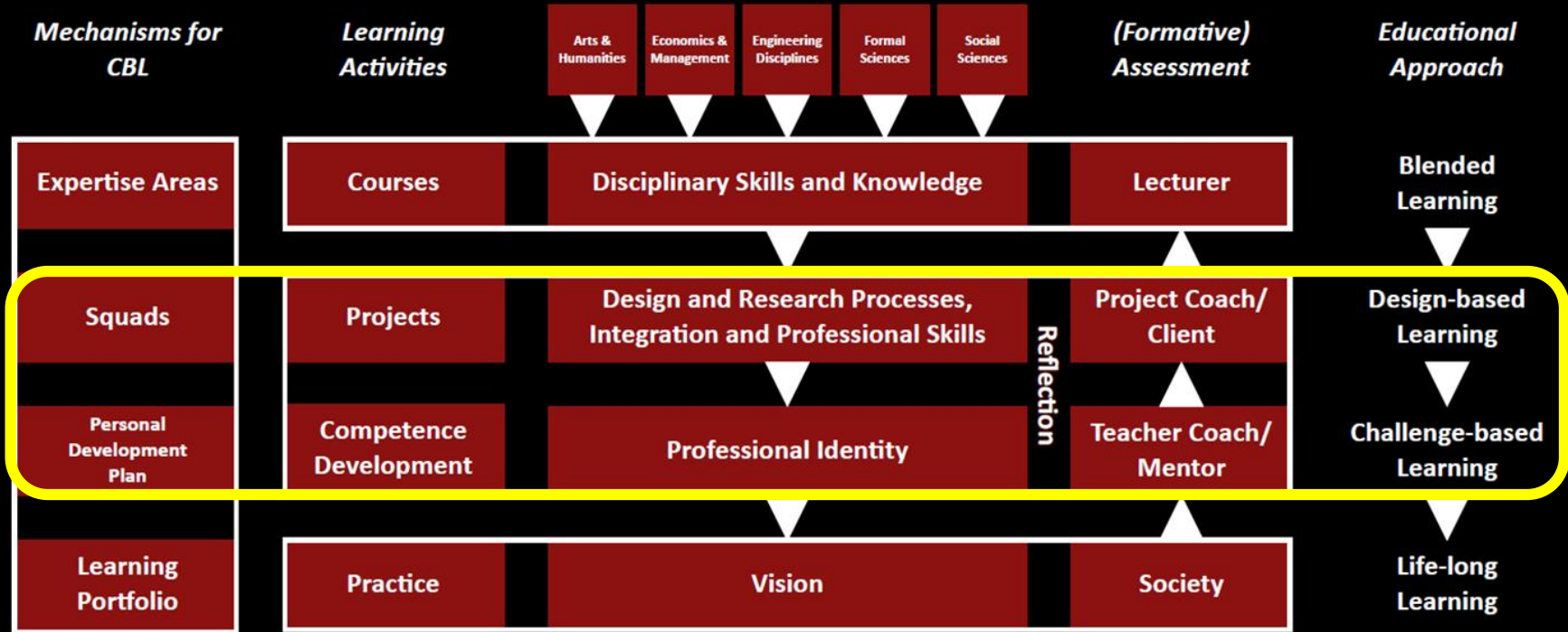
Integration courses E3



# Theoretical Framework

- **Design-based learning (DBL)** is an educational approach commonly used to foster students' design thinking (Gomez-Puente et al. 2013).
- **Challenge-based learning (CBL)** focus on multidisciplinary collaboration and involves different stakeholder perspectives, and aims to find a collaboratively developed solution, which is environmentally, socially and economically sustainable (Malmqvist et al., 2015)

# Overall Program Structure



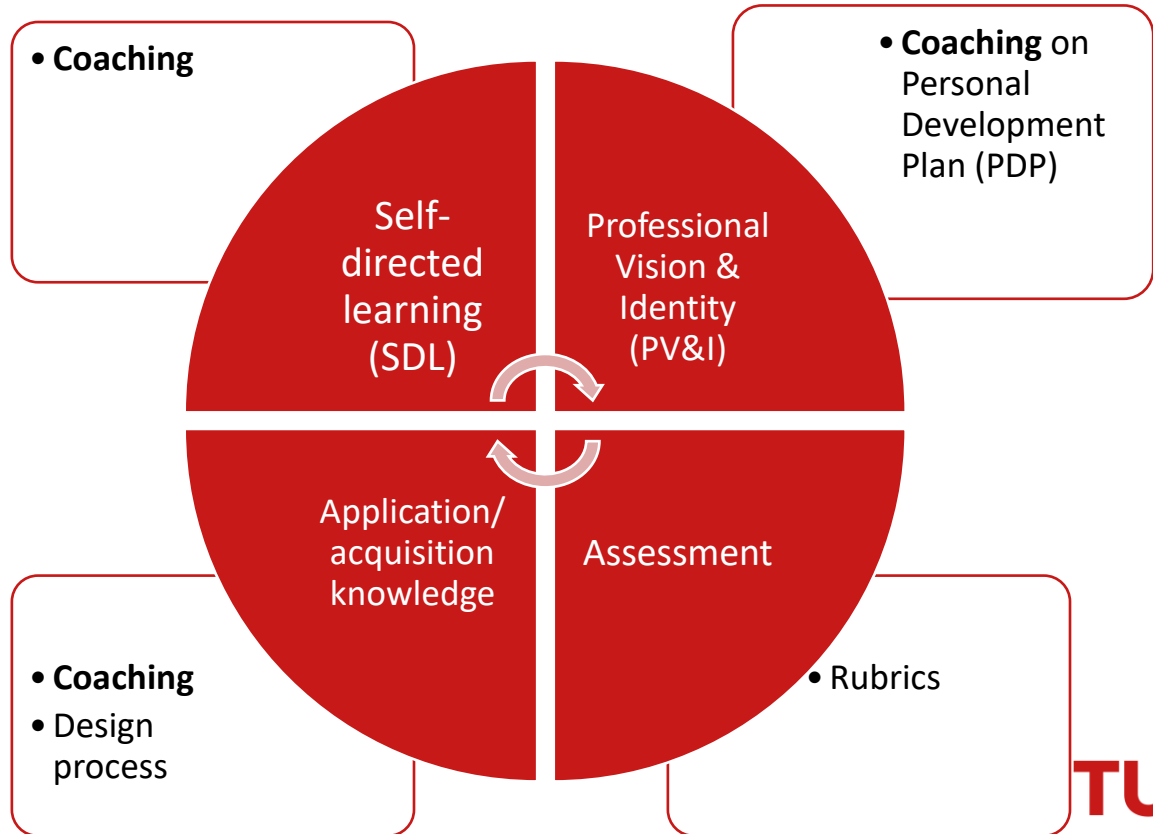


# Learning in Squads

- Squads as a model of a learning community that promotes students' learning.
- 9 squads on various themes (Vitality, Mobility...)
- Open space
- Students work on open-ended challenges based on own interest
- Multiple possibilities to reflect, present, get feedback, consult experts and interact with clients
- Multistakeholder approach
- Squads invite novice students to work collaboratively with experts and peers in order to learn from each other and transfer knowledge and skills to less experienced students or staff (Morton, 2012).

# Coaching in Squads

'coaching' refers to the process of advice-giving in coaches refer to the individuals participating in the advice giving situation (e.g., teachers, experts, stakeholders, and peers). Adams et al., 2017





# Coaching in Squads

## Knowledge related to design process

- Conceptual knowledge: the concepts, facts, and principles related to domain of knowledge) (Anderson, 1976).
- Procedural knowledge (design task strategies): knowledge of how to perform or operate in a situation (Anderson, 1976).

## Coaching can support design process knowledge by...

- Helping students form a design thinking mindset (Dannels, Gaffney & Martin, 2008)
- Directing students to improve design reasoning (Ball & Christensen, 2016)
- Offering advice in making explicit design decisions with associated rationales and consequences (Huet et al., 2007)
- Using disciplinary knowledge in context (Wolmarans, 2016).

# Coaching in Squads

## **Self-directed Learning**

- The pro-active process that learners engage in to optimize their learning outcomes

## **Coaching can support self-directed learning by**

- Encouraging students to plan, monitor and adjust design processes and guidelines (Reich et al., 2014),
- Providing opportunities for students to fail, succeed, and take ownership in design decisions (Daly & Yilmaz, 2016).

# Coaching in Squads

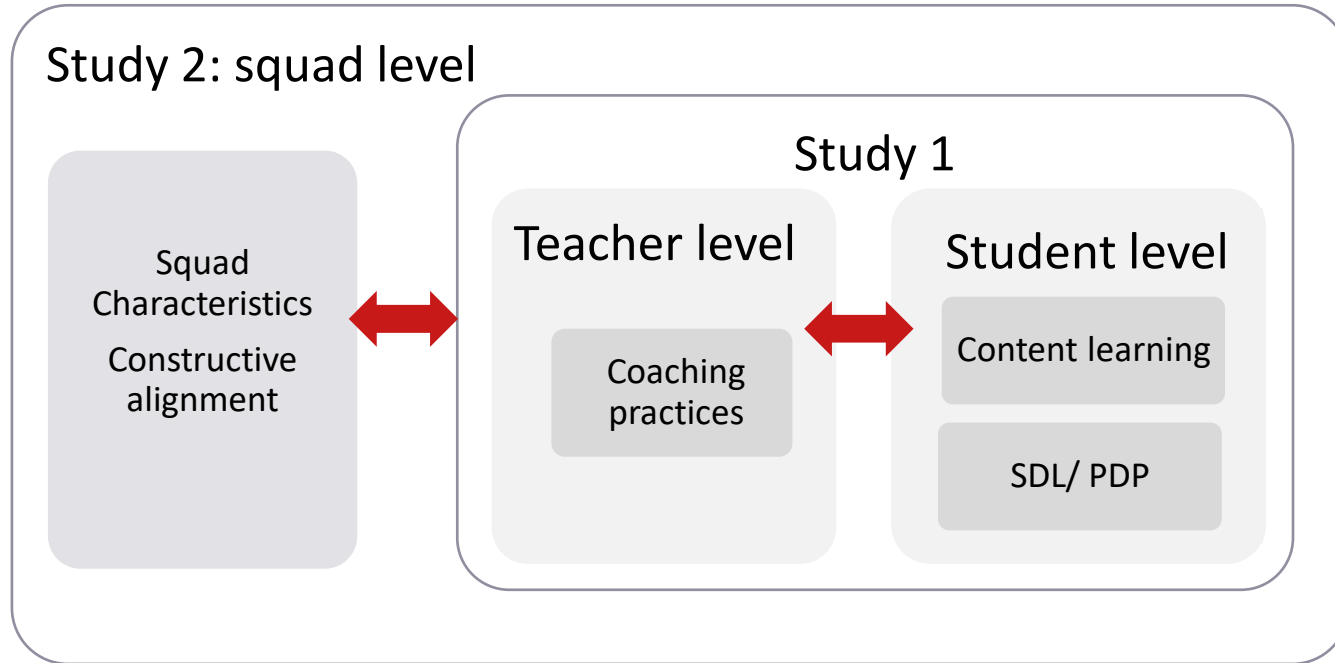
## Professional Identity

- Professional identity development (PID) is about how students views themselves as a future professional designers.
- PID requires the integration of one's personal traits, motives, competencies, values, morals, beliefs, and attributes with the norms of the profession and technical knowledge (Kunrath 2019; Van Diggelen and Morgan 2017).

## **Coaching can support professional identity development by..**

- Supporting them to construct their own design voice as they socialize students into the complexities and ambiguities of professional practice (Brandt et al., 2013; McDonnell, 2016).
- Modeling for students their own perspectives on design practice, (Gray & Howard, 2016; Uluoğlu, 2000).

# Our current research



# Research Questions

What coaching do students in ID need to develop:

- content knowledge (design process)
- self-directed learning
- professional identity

# Methodology



## **Interviews**

Individual interviews with 26 students of different levels and squads



## **Data analysis**

Thematic analysis on perceived need for coaching

# Descriptive characteristics

Students' coaching needs differed based on their

- Educational level (Bachelor vs Master)
- Project Characteristics (Individual vs Group and Open-ended vs more Structured)

Educational Level	Project Characteristics	
2 <sup>nd</sup> year bachelor students (n=11)	Group	Less open-ended
Final Bachelor students (N=5)	Individual	Open-ended
Premaster students (N=4)	Group	Less open-ended
Master research (N=6)	Individual	Open-ended

**Themes related to students' coaching needs...design knowledge****2<sup>nd</sup> year Bachelor****Final Bachelor****Premaster****Master (FMP)**

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Coach should support the design process-explain all steps and support in implementation

**v****v****v****v**

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Coach should provide feedback on design process

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Coach should provide feedback on prototype

**v****v****v****v**

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Coach should ask for elaborations on thinking process

**v****v****v**

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Coach should encourage students to consider multiple perspectives in their design <sub>15</sub>

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**v****v**

<b>Themes related to students' coaching needs...self-directed learning</b>	<b>2<sup>nd</sup> year Bachelor</b>	<b>Final Bachelor</b>	<b>Premaster</b>	<b>Master (FMP)</b>
Set expectations	v	v	v	v
Emphasis on students' choice	v	v	v	v
Support in decision making		v		v
Support in complexity management		v		v
Support in Knowledge management (design process)	v		v	
Support in time management	v		v	
Support in motivation		v		v
Support in collaboration	v			v



<b>Themes related to students' coaching needs...professional identity</b>	<b>2<sup>nd</sup> year Bachelor</b>	<b>Final Bachelor</b>	<b>Premaster</b>	<b>Master (FMP)</b>
Discussing students vision/future plans		v	v	v
Discussing students' professional identity	v	v	v	v
Discussing coaches' professional identity	v		v	
Support in finding opportunities for prof. identity development	v	v		v
Support in reflection of professional identity	v		v	
Give feedback on PDP plan	v		v	

# Conclusions

- Important differences among students
- Students are familiar with PI&V and (more developed) self-directed attitude
- FBP students need more support
- Students expected more attention from coaches in order to keep them motivated (during the Corona time) and show interest.
- Students don't admit that they don't know

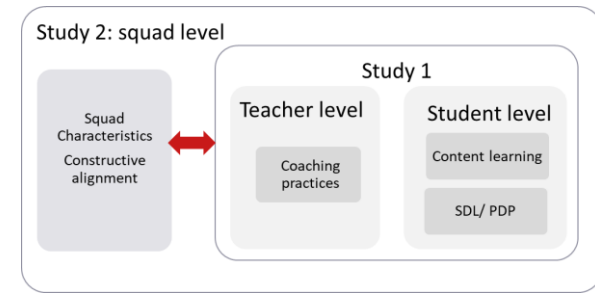
# Future Directions

## For practice

- Coaches' role is important
- Coaching/scaffolding on cognitive, meta-cognitive and motivational aspects
- More training for coaches starting in ID

## For research

- Study the learning environment of squads
- Longitudinal development of students



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# Thank you!

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Do you have any questions?