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Curriculum Development of Master's Degree Program in Industrial Engineering for Thailand Sustainable Smart Industry

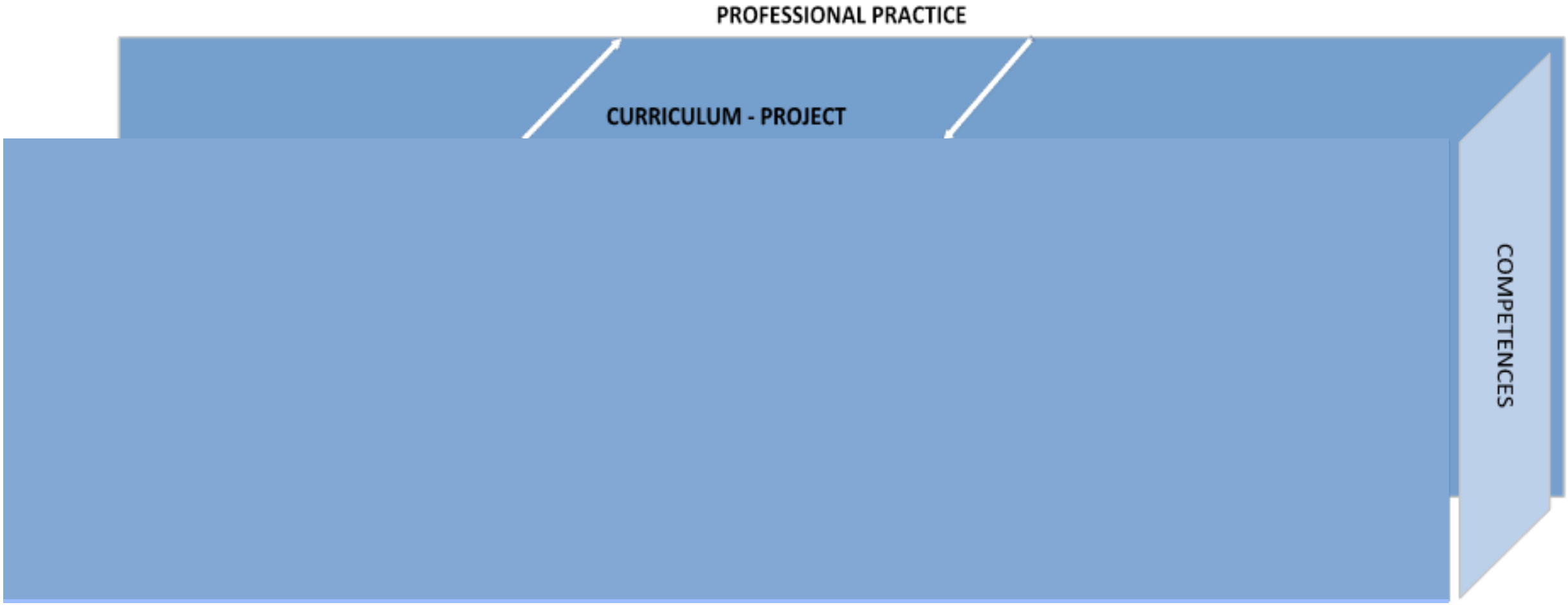
Workshop Training on PBL

WP3 - Task 3.4 Training of staff on new tools and best practice exchange on modern teaching techniques.

Rui M. Lima, Diana Mesquita

Universidade do Minho

Curriculum Development Model for HE



Mesquita (2015) - Model of Curriculum Development inspired in the ten criteria to assess quality of teaching in Higher Education – Zabalza, 2009

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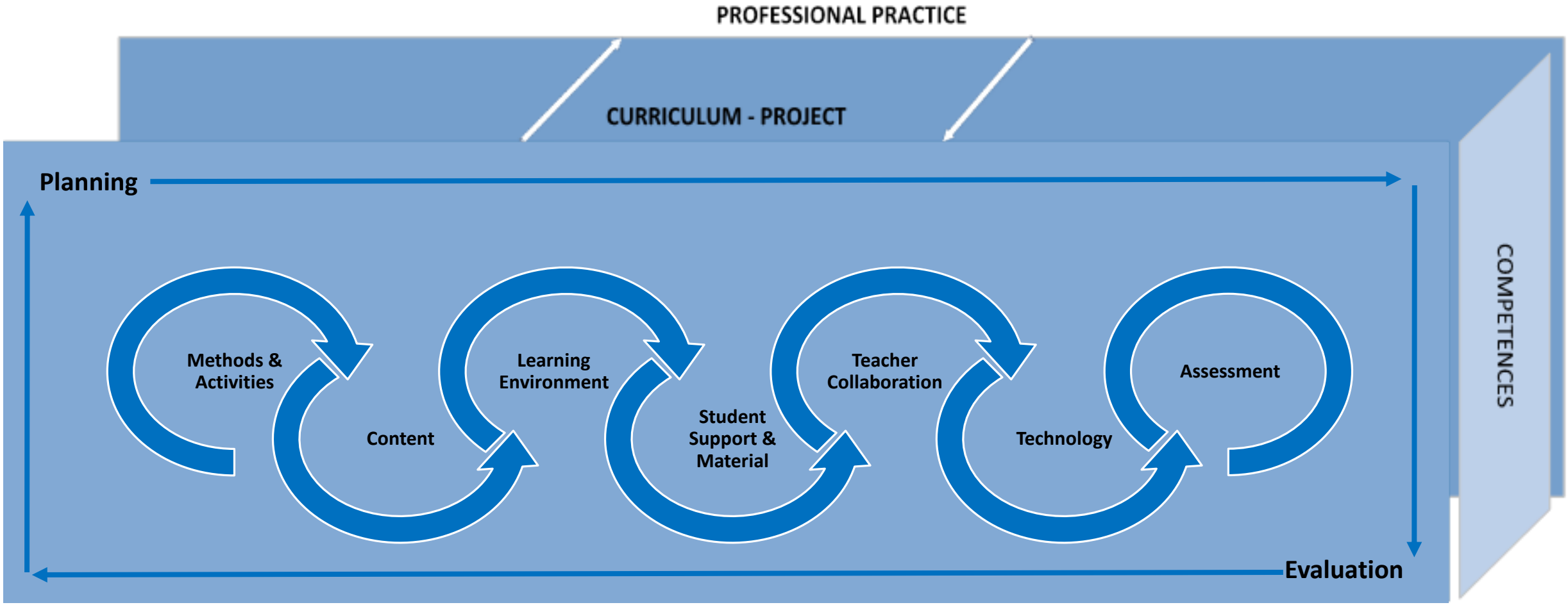
Curriculum Development Model for HE



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The Importance of Planning!

Key-competence in teaching (Biggs & Tang, 2011)

- Activities and Strategies; Contents; Learning Environment; Student Support (e.g. tutorials); Learning Materials; Evaluation; …

Road Map : Where are we? Where are going to?

- must be flexible

- must be intentional (what for?)

- must be clear for students

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Learning Outcomes

Learning Outcomes are "statements of what a learner is expected to know, understand and/or be able to demonstrate after a completion of a process of learning". CEDEFOP (2009)

- Requirements that are needed to develop during learning process in the context of a course (**"At the end of this course the students must…"**)
- Description should **include the competences** that are students are expected to develop
- Suggest an action (be observable) = **Statement starts with a verb**

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Super Hero Challenge !

1. What is the name of your super hero?

2. What is the super power of your super hero?

3. If you could change one thing in your super hero, what would be?

4. Share and discuss your idea inside the group.

5. Make a drawing of your super hero.

6. Why is your super hero the best in the world?

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How to define the learning outcomes?

BLOOM'S TAXONOMY

Bloom, B. (1979). Taxonomy of Educational Objectives. Handbook 1: Cognitive Domain. New York: David McKay.

Benjamin Bloom – Original (1956) and Revised (2001)

Framework to promote higher forms of thinking in education

Helps teachers to design valid assessment tasks and strategies considering the objectives defined **(curriculum alignment)**

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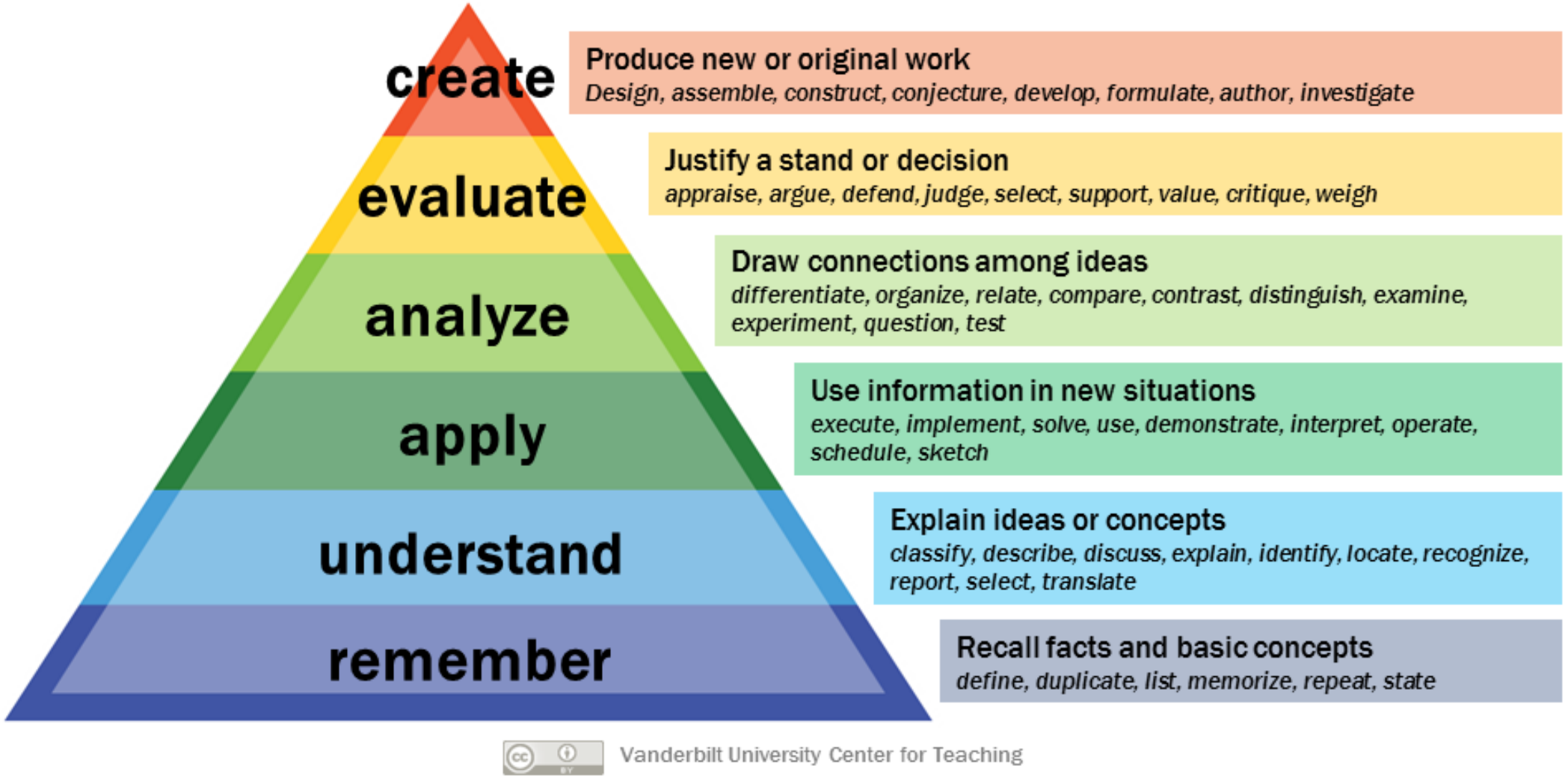
Source: cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/

Bloom's Taxonomy



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Remember – recall facts and basic concepts
Examples: Recognizing; Recalling; Identifying; Defining; …
Understand – explain ideas and concepts
Examples: Interpreting; Exemplifying; Classifying; Summarizing; Inferring; Comparing; Explaining; …
Apply – use information in new situations
Examples: Executing; Implementing; Solving; …
Analyze – Draw connection among ideas
Examples: Differentiating; Organizing; Attributing; …
Evaluate – Justify a stand or decision
Examples: Checking; Critiquing; Arguing; …
Create – Produce new or original work
Examples: Generating; Planning; Producing; …

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Create – Produce a new or original work

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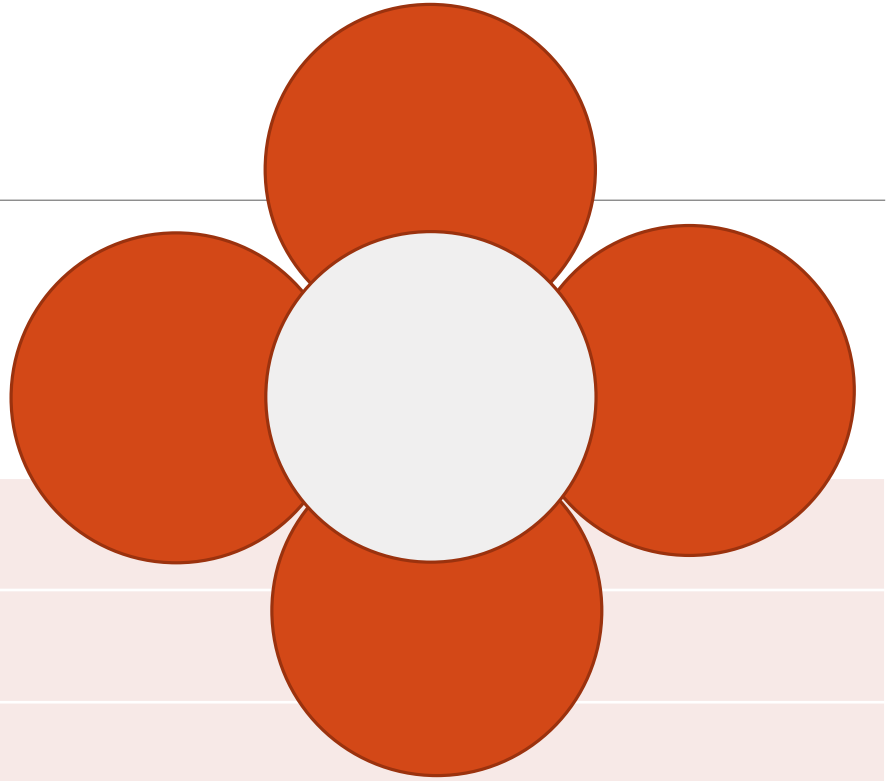
PBL – Learning Outcomes Examples

Integrated Project in Industrial Engineering and Management II



Plan, develop and manage an interdisciplinary team project.

Apply the contents of the courses in the context of the project.

Evaluate the project proposal considering predefined criteria.

Write reports and undertake oral presentations.

Learn how to work as a member of a team and independently.

Develop solutions for complex real problems identified in the companies.

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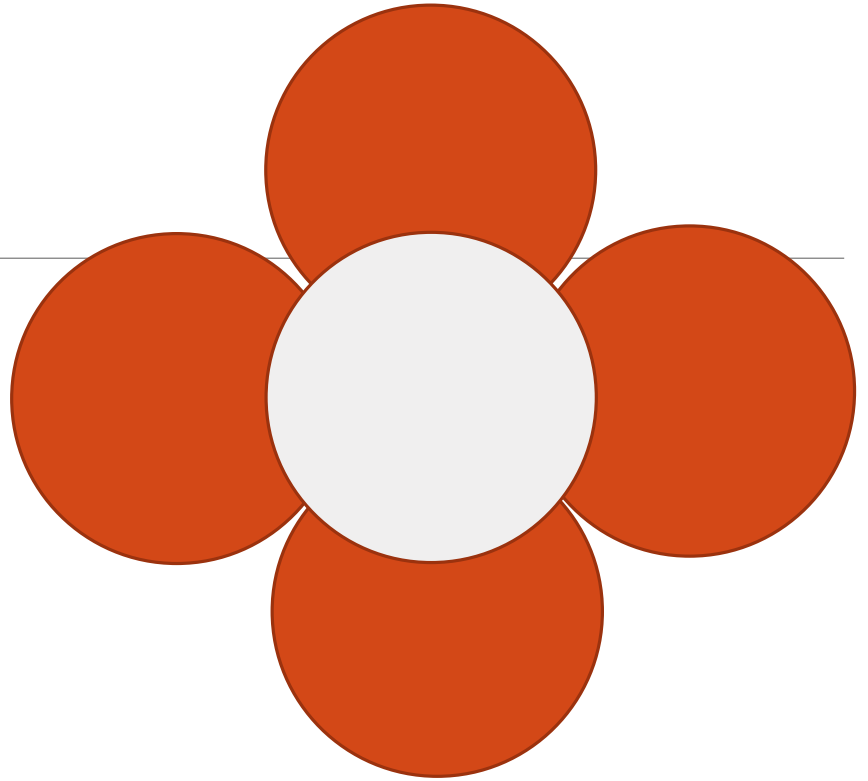
PBL – Learning Outcomes Examples



Integrated Production Management

Demonstrate ability to use measuring devices of physical agents (noise, lighting and thermal environment).
Identify the requirements for implementing the functions of Integrated Production Management (IPM).
Discuss the implications of different methods and functions of Production management.
Relate and integrate organizational processes and techniques of Integrated Production Management.
Identify, describe and analyze processes of Integrated Production Management.
Write reports and undertake oral presentations.
Develop competences of communication in a foreign language.

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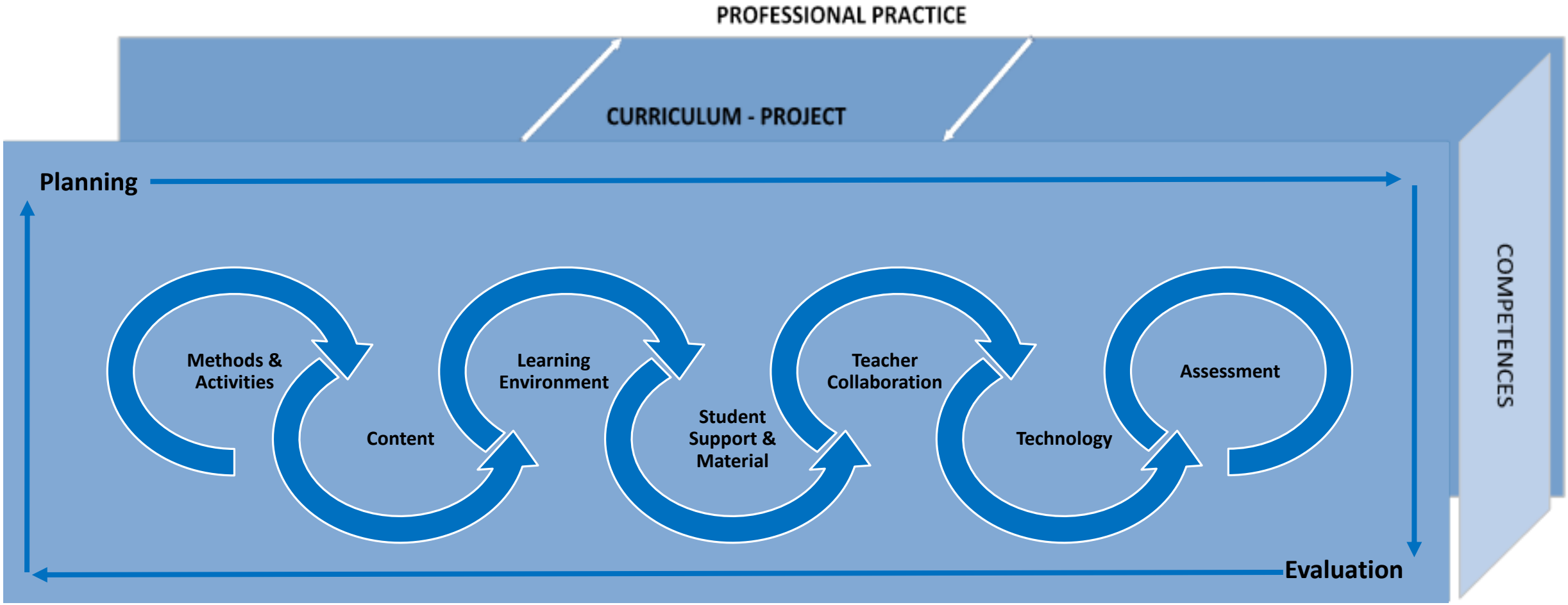
Curriculum Development Model for HE



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Assessment: Introduction

The ways in which students look at assessment **impact on their approaches to learning** (Boud and Falchikov 2006, Fletcher et al 2012).

Samuelowicz and Bain (2002, p. 181) found that different **teachers' orientations or beliefs** result in different assessment practices.

* Teachers who see the teaching and learning process as reproduction or **transmission of knowledge** view assessment as students' ability to reproduce the knowledge acquired.

* Teachers who see teaching as facilitating learning and **promoting critical thinking** view assessment as transformation of knowledge and as an integral part of the teaching and learning process.

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Assessment for Learning (Sambell, McDowell & Montgomery, 2012)

Introduce alternatives ways to assess based on student centred learning (Gijbels & Dochy, 2006; Seger & Dochy, 2001; Struyven et al., 2008)

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Student assessment in PBL

Student Assessment

- Continuous Assessment of PSC (>50%)
- Project Assessment (<50%)
- Written Tests and / or Work Assignments
- Deliveries and Peer Assessment (Individual)

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Project Assessment

Project Assessment (Individual)

Peer Correction Factor (average 1.0)	Product Assessment (Team)			
Effort level at work; Creativity; Interpersonal; Relationship; Delivery times…	**Preliminary Report (35%)**	**Final Report (revision after feedback) (25%)**	**Developed Prototypes (20%)**	**Final Public Presentation (20%)**

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3 KEY IDEAS (1/3)

Using different methods help us to assess different competences

(Struyven et al., 2005; Bloxham & Boyd, 2009)

Method	%
Tests	90,2%
Oral presentations in group	89,1%
Reports in group	83,8%
Individual reports	74%
Project in group	67%
Practical or experimental work in group	65,3%
Individual written reflections	59,5%
Practical or experimental work individual	52,6%
Group written reflections	48%
Individual oral presentations	28,9%
Individual project	26,6%
Individual portfolio	23,7%
Oral tests and oral examinations	22%
The students are asked to perform self-assessment	19,6%
Portfolios in group	17,9%
The students are asked to perform peer assessment	17,9%

(Pereira, Niklasson & Flores, 2017)

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Example – Exam [assessment for learning]

"The exam can be faced as a moment where learning still can happen. Six students, six different versions and they can teach each other. Innovation is needed!"

Domingos Savio Giordani
19.07.2016

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3 KEY IDEAS (2/3)

Importance of feedback

(Ramsden, 1996; Knight & Yorke, 2003; Orsmond, Merry, & Reiling, 2005; Flores et al, 2014; Pereira, et. 2016)

Timely + Relevant + Suitable for the context +
Recognized and understood by both students and teachers

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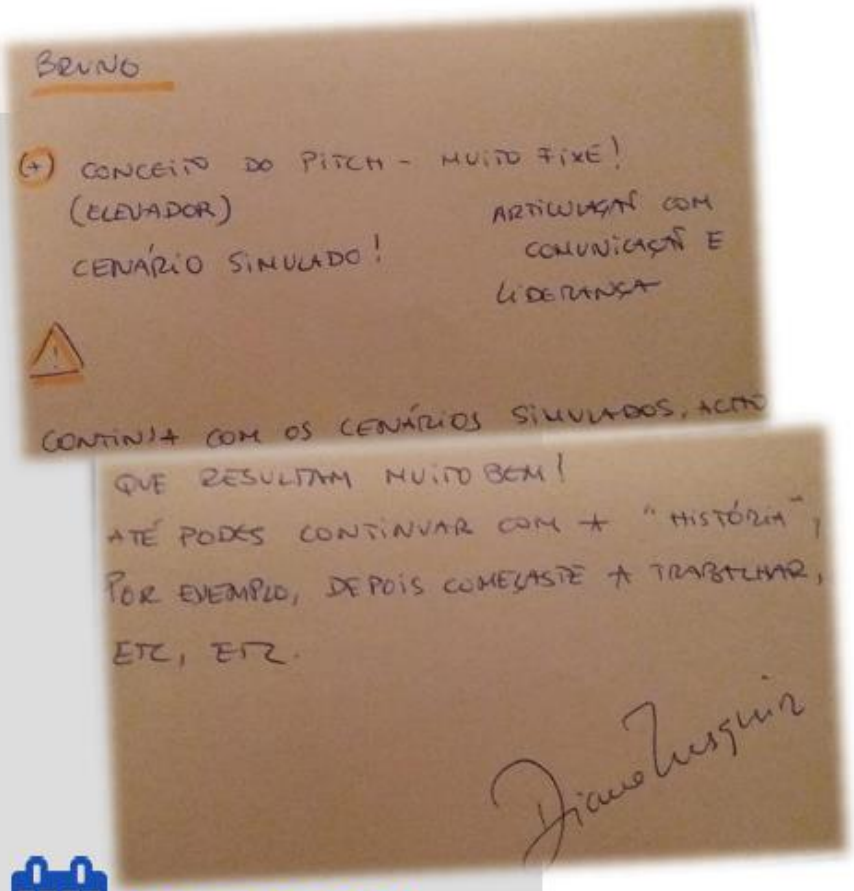
Example – Feedback [assessment for learning]



1 de abril 2019

A somar a este exemplo, fiz questão de apresentar um outro no qual o parecer da Diana foi essencial a que eu tivesse mantido a **confiança** e a **motivação** para continuar a desenvolver algo diferente. Havia realizado uma apresentação intercalar e recordo-me que o conselho que me deu foi de encontro ao que eu tencionava fazer dali para a frente, tendo eu encarado este *feedback* como uma "**aprovação**" relativamente ao meu trabalho.

Foi nesta lógica que decidi enquadrar a temática do *feedback* no âmbito da liderança, por realmente achar que **críticas construtivas**, vindas de alguém que tomamos como nossos **líderes**, podem influenciar em grande escala a nossa motivação, o nosso **(des)empenho** e, consequentemente, o nosso trabalho e **sucesso**.

3 KEY IDEAS (3/3)

Students Participation: Self and **Peer Assessment**

(Segers & Dochy, 2001)

PBL – teamwork competences

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Example – Peer Assessment [assessment for learning]

$Gr_{k,i,j}$

GrT_k

Grades atributed **to** element #	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3
Grades atributed **by** element #	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5
Criteria																					
Presence at meetings	0	9	10	10	10	10	0	0	10	0	10	10	10	10	0	0	10	9	0	10	10
Effort level at work	0	8	7	8	8	8	0	0	8	0	8	8	8	8	0	0	8	8	0	8	8
Suggestions / Solutions	0	9	8	9	8	9	0	0	9	0	8	9	8	9	0	0	9	9	0	9	9
Creativity	0	7	7	7	7	7	0	0	7	0	8	8	7	8	0	0	7	7	0	7	7
Interpersonal Relationship	0	8	7	7	7	8	0	0	8	0	8	9	9	9	0	0	9	10	0	9	9
Delivery times	0	9	8	7	8	8	0	0	8	0	9	8	8	9	0	0	7	9	0	8	8
Total	0	50	47	48	48	50	0	0	50	0	51	52	50	53	0	0	50	52	0	51	51
Total Grades	243								256								257				
Average	253																				
Correction Factor	0,96								1,01								1,02				

$\overline{GrT}$

CF_k

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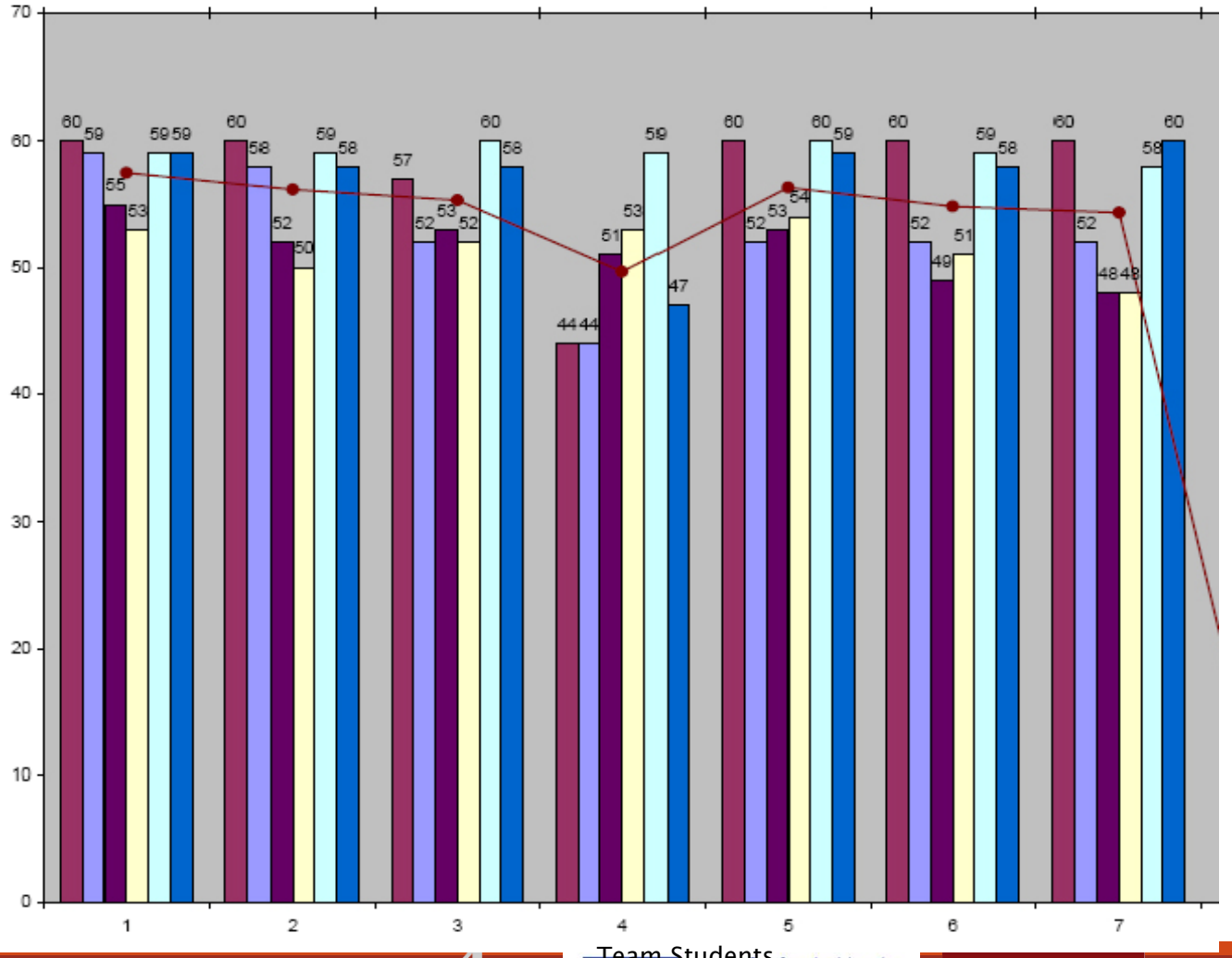
Peer Assessment



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