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We aim to offer standards and guidelines to assess and improve the teaching quality of informatics in primary and secondary schools.

Motivation

Feedbacks and inspectors are the usual forms when assessing the improvement of the teaching quality. Sometimes, those results are biased and not objective, depending on personal feelings and subjectivity. In fact, there are no standards to assess preparation efforts and teaching process. Similar problems were to be found a lot in the field of software engineering, and it turned out that the introduction of a maturity model helped with improving the situation in respect to quality. Like Chen et al. [1] or Montgomery [2], we believe that teaching is related to processes (and services to some extent), and thus we suggest to introduce a Teaching Maturity (TeaM) model, borrowed from SEI's CMMI [3].

TeaM Model

One aspect of the TeaM model is that teaching is treated as a service where quality is of high relevance. It thus determines the factors related to teaching quality and refers to them with the term **Process Areas (PAs)**. The implementation of a PA is then assessed by two representation paths: (a) a continuous representation via **Capability Levels (CL)**, improving the process by implementing one individual PA, and (b) a stage representation, mapped to **Maturity Levels (ML)**, improving the process by implementing a set of related PAs (Fig.1).

Each PA consists of Specific Goals (SG) and Generic Goals (GG) (Fig.2).

A SG for instance "Establish Course Materials" includes Specific Practices (SP), e.g. "Define the basic course materials". Similarly, a Generic Goals (GG), e.g. "Institutionalize a Reflected Process" includes Generic Practices (GP) e.g. "Establish an organization policy". A set of Specific Goals/Practices needs to be fulfilled with a specific level of capability in order to reach a specific level of maturity.

Method

Such a model can now be (and is) used for either assessment or improvement activities. The education institution is responsible for the assessment, which contains a list of standards in form of a check-list. Moreover, the teachers can use the model to check the improvement of his or her performance.

Level	Capability Level	Level	Maturity Level
0	Deficient - None of the relevant factors of the teaching process are implemented.	1	Chaotic - the teaching process is neither controlled nor efficient.
1	Accomplished - The relevant factors of the teaching process are taken into consideration but there is no plan on implementing them.	2	Initial - the teaching process is under minor control and little efficient.
2	Reflected - The relevant factors of the teaching process are planned and implemented in accordance to the policy. There is the plan for performing the process, resources are provided, responsibilities are taken, is controlled, monitored and reviewed.	3	Repeatable - the teaching process is sparsely standardized and monitored.
3	Defined - The relevant factors of the teaching process are standardized.	4	Stable - the teaching process is standardized, monitored and controlled.
		5	Optimizing - the teaching process is continuously improved and ready for further teaching process upgrades.

Fig.1

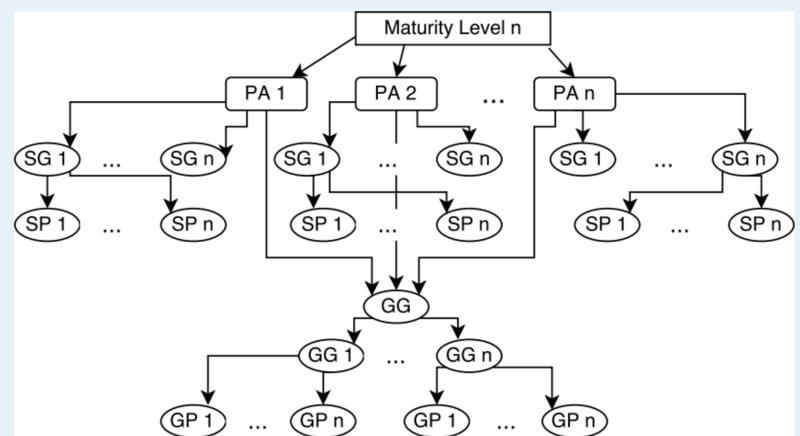


Fig.2

Case Study

Let us assume that we have a teacher with teaching properties as those enclosed by the red area in Fig. 3. The assessment based on the TeaM model shows that the teacher is at ML2 (Initial). When the teacher wants to improve the teaching process by one stage, the model suggests to implement the following PAs first: Teaching Unit Delivery and Environment / Infrastructure Management. And, improving even one more stage means to deal with other PAs as well.

	Maturity Levels (MLs)						PAs relevant for MLs
	Chaotic (1)	Initial (2)	Repeatable (3)	Stable (4)	Optimizing (5)		
Teaching Unit Delivery	CL 0	CL 2	CL 3	CL 3	CL 3	Initial (2)	PAs relevant for MLs
Environment/Infrastructure Mgmt.	CL 0	CL 1	CL 3	CL 3	CL 3		
Course Design	CL 0	CL 2	CL 3	CL 3	CL 3	Repeatable (3)	
Incident Resolution/Prevention	CL 0	CL 0	CL 1	CL 3	CL 3		
Teaching System Development	CL 0	CL 0	CL 2	CL 3	CL 3		
Teaching System Transition	CL 0	CL 0	CL 2	CL 3	CL 3	Stable (4)	
Teaching Continuity	CL 0	CL 0	CL 3	CL 3	CL 3		
Work Monitoring and Controlling	CL 0	CL 0	CL 0	CL 2	CL 3	Optimizing (5)	
Teaching Process Control	CL 0	CL 0	CL 0	CL 2	CL 3		
Teaching Process Reflection	CL 0	CL 0	CL 0	CL 0	CL 3		

Fig.3

Outlook and Summary

An assessment of the teaching process is important not only to underline the commitment of teachers but also to motivate them to improve their skills and their teaching processes. Considering the fact that there is not one standard model for such an assessment, we aim at providing a single model, called TeaM model.

The next steps are now to do a holistic study concerning the teaching process in primary, secondary and higher education.

References:

- [1] Chen, C.Y., Chen, P.C., Chen, P.Y.: Teaching Quality in Higher Education: An Introductory Review on a Process-Oriented Teaching-Quality Model. Total Quality Management and Business Excellence, 25, 36–56 (2014).
 [2] Montgomery, B.: Developing a Technology Integration Capability Maturity Model for K-12 Schools. Published Diploma thesis. Concordia University, Montreal, Canada (2003).
 [3] Forrester, E.C., Buteau, B.L., Shrum, S.: CMMI for Services. Guidelines for Process Integration and Product Improvement. Second Edition. Pearson Education, Inc. USA (2011).