Creative Students Need Creative Teachers

Fostering the creativity of university teachers: a blind spot in higher engineering education?

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Abstract— **Fostering students' creativity is one indicator for good teaching and learning in higher engineering education. Recently, several approaches for fostering creativity in higher engineering education have been developed. In Germany and other countries, innovative learning and teaching concepts that allow students to unfold their creativity have been put into practice. However, further education trainings for teachers in higher education have shown: university teachers' creativity lacks a courageous attitude to change their teaching in order to foster students' creativity. In this paper, the connection between creativity and courage is presented and used to analyse the experiences that have been made with the task "do something unusual" in further education trainings. As a result in can be statet that students mainly fulfill the task "do something unusial" appropriately, while teachers mainly show strategies of pseudo-solving. The reasons for resitance and avoidance seem unclear, yet. Nevertheless, the implementation of innovative learning scenarios is a creative process itself, and teachers' courage has to be promoted in order to overcome fears that emerge in creative situations.**

Keywords—creativity in higher education, teachers creativity, innovation in teaching and learning

I. INTRODUCTION

The term *"creativity"* is not recorded in the German "Charta guter Lehre" [1] and not even in the otherwise substantial keyword collection of the German "Qualitätszirkel" [1]. Nevertheless many works in higher education deal with creativity with the aim to make a contribution to good teaching and learning practices [2][3][4][5][6][7]. The implementation of teaching and learning scenarios that foster students' creativity [8] requires itself an act of creativity for the teacher [9]. Longstanding experience in higher educational trainings on creativity shows how challenging this can be for teachers [10]. They usually tempt to prefer incremental changes across from radical innovations [11]. According to this it is important to foster teachers' creativity (besides students' creativity), however not in terms of creating new ideas but with the "courage to create" [12]. The relation between creativity and courage will be discussed in the following. Subsequently a practical exercise will be presented that deals with this concrete context and that was realized with teachers and students several times

II. CREATIVITY AND COURAGE

As a reason why university teachers have troubles with the realization of innovative teaching and learning scenarios was identified, that "failing" is considered as harmful in the professional socialization of scientists and associated with nonprofessional work and the waste of resources [11]. This corresponds with the findings of [13]. With a view to the waste of creative potential in higher education he reports from a failure of universities and describes them as a place where innovations, the searching for new ideas and thinking against the norms are not only unpopular but rather get systematically prevented [13]. Teachers need to overcome this obstacle to take the risk of "failing" and to leave the norms of the higher educational system behind. Ref. [14] describes all creative actions as "navigating in open systems". Routines and traditions give people the feeling of safety; they allow a safe navigation along known expectations, and who remains on this paths doesn´t have to fear criticism or negative feedback: "Laws, rules, regulations, conventions and taboos reduce complexity and create a relatively safe frame for a peaceful, organized life and coexistence." Ref. [14] speaks of "closed systems" that bring about inner safety.

A. Creativity as transition of social systems

However, creativity means to leave this closed system and to strike off into a new closed system. When somebody is creative, he leaves the well-known routines, traditions and norms for a while. For the instance of the transition they are in an "open system" in which they do not know the expectations they are faced with. They cannot know which feedback they get (positive or negative) for their creative actions – if they get criticized or honored: "In the moment of transition from one closed system to another one appears a temporary open system, an exposed position that contains risks and accordingly is frightening."

Value	Operational definition
Benevolence	Preserving and enhancing the welfare of those with whom one is in frequent personal contact
Universalism	Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature
Self-direction	Independent thought and action—make own decisions, create, and innovate
Stimulation	Excitement, novelty, adventure, and risks in life
Hedonism	Have a good time, have fun, and do things that bring gratification for oneself
Achievement	Personal success through demonstrating competence, seeking admiration, and impressing others
Power	Wealth, control, or dominance over people and resources
Security	Safety and stability for oneself and one's country
Conformity	Restraint of actions and intentions that could upset or harm others and/or violate social norms and rules
Tradition	Respect, commitment, and acceptance of the customs and ideas that one's culture or religion provides

Table 1 [15] ten basic values and their operational definitions (cited from [16])

B. Emergence of expectation awareness and orientation in early childhood

Children's ability to be aware of and orientate themselves towards the expectations of others emerge very early at the age between three and a half and four years. From then on, children are able to

- capture the mental conditions of others [17]
- predict their behaving and feelings, and distill predictions for their actions [18][19]
- predict postive and negative consequences of their own behavior effecting the affirmative or intimidating behavior of others [20][21]

That gives the premise to behave prosocial towards others, which is normally sanctioned positively and leads to stronger acceptance from others [19]. Ref. [16] stresses that prosocial behaviour is influenced by 10 basic values of all human cultures identified by [15] and depicted in table1. Thereby, values like self-direction and conformity are in conflict with each other.

C. Expectations of others in Higher Education

Transferred to higher education the assumption can be made, that in earlier academically development conformity was stronger fostered than self-direction. An example of the discipline law [22] shows how students get socialized to

conformity through the pressure to perform and through exam anxiety: "Successful candidates for an exam stand out through little failure anxiety, endurance, conflict avoiding socialization, readiness to assimilate and confidence. In such a way described successful candidates identify themselves easily with the privileges and the authority to exert power from the position they are going to occupy after their exams." In the professional life of academics, people are precariously occupied in the social middle class and so in a group that reacts on the fears of the pressure to perform, overextension and social decline with the "return of conformity" [23].

D. The courage to create

On this occasion, [12] reports about the "courage to create" being necessary. For [12], the courage to overcome personal fears belongs to creativity. In his work about the correlation between courage and workplace, [24] defines - referring to [25] - the term courage as "acting intentionally in the face of risks, threats, or obstacles in the pursuit of morally worthy goals".In summary it can be stated that teachers have to face their fears in open systems, or actually, if they intend to open the closed system for realizing an innovative teaching method to foster their students' creativity.

III. THE "DO SOMETHING UNUSUAL" TASK

According to [26], courage can be learned slowly step by step. Inspired by that, the authors developed and integrated special trainings into higher engineering educational workshops for teachers and also into students´ courses at different universities:

- **Through the barricades** (for teachers in HE)
- **Rage against the machine** (for teachers in HEE)
- **Studying creative** (for students' of all subjects)
- **Creativity in engineering education** (students enroled in engineering programs)

First of all, these trainings demonstrate the meaning of "courage for creativity", and secondly – repeated regularly with small increases - want to offer an approach to act more out of courage for reflecting and finally exceeding conformity. The participants get the same task in all trainings: Do something unusual! Not in the sense of a 'test of courage' but as an encouragement to overcome challenging difficult social situations: "Leave the comfort zone of safe terrains of normative regulative social routines and traditions! Go against something you for yourself have declared as an social interaction norm!"

After setting the task participants always ask what is valid as a norm transgression and how spectacular it should be. It can be seen that norms are understood and sensed in a different, subjective way. What builds a norm transgression for one person, is completely "normal" and inside the norms for another one. That is why it is important that every participant is able to find a solution for this task along his very own norms. The same task for every participant would lead to a comparability of mastering it but it would also contain the danger of demanding too little or – even worse – too much of

individual participants. So all participants should find a solution corresponding to their individual situation and requiring at least some courage but doesn´t overwhelm them. No solution is too unspectacular, no solution is wrong, as long as it gets realized and reflected anyway.

IV. Observing The "Do something unusual" Task

Giving this task, there are some observations that can be done regularly:

A. Oppositional Teachers

Teachers often face this task with (sometimes very strong) resistance. In workshops with engineering teachers the task is given as homework between the first and the second workshop day. Homework as such seems to cause discomfort for many of the teachers. Getting faced with the point that they expect the same from their students and that the task takes just a little time (with some creativity it can be solved by the way), they come to a substantial rejection. As experience has shows, a majority of involved teachers rejects the task because its sense is not seen or the teachers do not consider it as important or they do not have any ideas how to solve it. Summarized, giving this task can contain a danger for the relationship between the workshop moderation and the participants even though the rest of the day was successful. It often ends up with the open announcement of the participants that they are not going to do this.

B. Responsive Students

Students face this task (that has to be fulfilled until the next date) mainly with curiosity. But they also mention some concerns that their ideas to solve the task could be too unspectacular for the other participants. The task gets accepted by a majority after repeating for several times that no idea is too unspectacular and no one should ask too much of himself or herself and at least the task is no competition but the possibility to deal with each ones individual willingness to creativity.

The different understandings of teachers and students are visible in the processing of the task:

C. Teachers' avoidance strategies to pseudo-fulfil the task

As said before, teachers in the majority do not solve the task or at least not in the sense it should be. Popular and in some way understandable creative is the solution "For me it is unusual not to fulfill given tasks, that´s why I didn´t do this homework". Many teachers also solve the problem intentionally wrong, e.g. "Normally, I never indicate while driving a car, so this time I did so. That is unusual for me.", "Since a long time my wife and I think about euthanizing our old and very ill dog but never found the courage to do so. Now yesterday we´ve done that as part of the homework." or "I normally never listen to my best friend on the phone. Yesterday I did so. This was unusual for me and it wasn't worth it.". But there also are always teachers who take the homework serious and solve it correctly. A positive example is a teacher from Berlin who first also rejected the task completely but then decided to buy a rose and to give it as a present to the first person that sits down beside her in the subway on her way to the second workshop day. She didn´t feel comfortable enough with the appearance of the first person but the second person was an old man to whom she gave the rose and wished him a nice day. She found out that the man was on his way home after a hospital stay for weeks because of a cancer therapy.

D. Students' appropriate strategies to fulfil the task

Students just refuse the homework very rarely. Mostly in their reports an accurate examination of the problem can be observed: In the majority the students find a personal benefit and search for a solution that fits to their individual context despite their fears of the uncertain situation. The solutions vary quite strong because of the diverse structure of the student groups. For example one student was active in a Death-Metal group. In their meetings everyone wears black clothes. To solve the task she went there with usual street wear. Another student opened a beer and drank it in a seminar and still another one played songs in the pedestrian mall and collected money for that. One student decided to take off his shoes and walked the long way home without wearing them, while another student went shopping in his Pajama. To give two more examples, one student decided to sit down in the middle of a small and highly frequented passage inside the library, and yet another student dialed a phone number she did not know to overcome her fear of talking to strangers. Also some students do not solve the task correctly. For example one student did a bungee jump. But in the group of students these are exceptions.

E. Participants' reflections

In the following discussion the participants should describe the feelings they had before while and after solving their tasks. A typical process with individual variances can be observed: With the development of the idea and the decision to realize it there comes a stage of uneasiness that becomes stronger and stronger and reaches its climax right before the actual realization. In the situation itself the uneasiness changes into a concentration on the situation. The own actions and the reactions of the surrounding are observed in many details. After the realization there comes a time of relaxation and a feeling of proudness to have stood the challenge.

V. Findings And Discussion

The concrete reasons why engineering teachers struggle so much more with the task "Do something unusual" than students do is not known. But the observation corresponds with the argumentation that teachers have spent more time on the subject-specific and professional socialization at their university and so have internalized the norms through positive feedback of conformity which complicates going against the established routines.

Although the academic system with its main purpose of developing knew knowledge depends on creativity and non-conformity (like e.g. art), it can be seen how difficult it is for teachers to leave their usual ways of conformity and to do something unusual. Higher educational trainings that only

focus on fostering students' creativity are not enough here. On this occasion trainings to foster students' creativity should always be linked to trainings to foster teacher´s creativity. Creative teachers then cannot just foster their students' creativity in a better way. With their escape of the closed system in economy they are able to see and name its deficits. Only thereby the conditions for changes are created.

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