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Professionalization of Tutors in Chemistry: Conceptual Perspectives for the Design of a Tutor School

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Abstract

Tutorials substantially support university teaching in Germany. In chemistry their purposes vary from providing students with mentored settings, in which the contents of previous lectures are recapitulated in small groups, to supervised seminars with the focus on laboratory work. This academic form of teaching is usually led by students of higher semesters as group leaders, so-called tutors. The design of the learning arrangement lies in the hands of the tutors, who usually have little teaching experience and at most basic knowledge regarding chemistry didactics. Hence the problem arises, that most tutors often lack learning-effective and student-centered methods as well as an understanding of their own role as tutors. As a result, the imitation of a lecturer-centered form of teaching can be observed, although the tutorials should rather focus on active knowledge processing and practice. It becomes clear that the tutors need to be prepared for their particular work in order to avoid reality shock in teaching as well as strengthen their role as learning guides.

The purpose of this paper is therefore to introduce a concept for the training of tutors and an according basic unit. This basic unit includes the following targets: (1) clarifying the understanding of the tutors' roles (2) facilitating a change of perspectives between the different roles (3) getting to know and experiencing student-centered teaching/learning methods (4) imparting relevant didactic aspects (such as the Johnstone Triangle) (5) refining the ability to analyze characteristic types of students to highlight the importance of classroom management.

Keywords: *Tutor School, Professionalization, University Teaching, Learning Guide, Student-Centered Methods;*

1. Introduction

Learning processes at the university are significantly supported and fostered by tutorials. In this article, a tutorial is understood as the following [1]: A tutorial is an academic teaching form in which like-minded people, such as students attending the same lecture, learn together in small groups under the guidance of tutors. Typically, they accompany classical lectures by promoting specialist competencies in peer-to-peer learning arrangements. They are intended to encourage students to actively engage with the material taught in the lecture and to support exam preparations. It becomes clear that learning processes become easier for young students, the better the tutorials are designed [2]. Thus, the quality of the tutorial is mainly influenced by the appointed tutors, mostly students of higher semesters, who are largely selected on the basis of their specialist competencies [1, 3]. This is often based on the assumption that someone who has extensive specialist knowledge is also able to communicate this comprehensibly [4]. It is often neglected, however, that in most cases the tutors are not aware of the didactic, personal and social skills they need to initiate, accompany and support student learning processes [1].

In preparation for their work, the tutors are not being adequately qualified by the university and the faculties, which leads to them oftentimes perceiving their teaching assignment as a major didactic challenge [1]. As a result, the tutors adapt the lecturer-oriented teaching style of their professors, leading to tutorials dominated by "chalk-and-talk" settings instead of the intended active application of the lecture contents [1, 4]. Students can thus be deprived of the opportunity to independently design their own learning processes and actively process new knowledge. This partly has a negative impact on exam results and could lead to longer study periods and higher dropout rates [1, 4]. In addition to these possible negative consequences, professors see certain risks in the assignment of tutors. A main risk is the unequal quality of the tutorials, which is expected to be counteracted by a qualification of the tutors [5].

In order to be able to increase the quality of the tutorial teaching through the adequate support of student learning processes, the tutors should be prepared more specifically for their tasks. Therefore, the

present contribution concentrates on the concept for the training of tutors as well as the construction of a basic unit.

2. Concept for a Tutor School

The concept of training tutors considers three key points (see Figure 1). These three points include:

(1) **Basic Unit:** The basic unit should be attended obligatorily by all tutors to ensure a general understanding of teaching and learning at the university. Thus, the basis for an increased quality for the tutorials is laid on the one hand and on the other hand the basis for the advanced units is created.
(2) **Advanced Units:** The advanced units are designed to deepen the understanding about teaching and learning settings, allowing tutors to achieve professionalization in various fields. Above all, the advanced units should ensure direct apllication based on specific tasks.
(3) **Tutorial:** The tutorial is the highest level above the individual training units. Here the trainees should apply their acquired knowledge from the individual training units directly in their own tutorials.

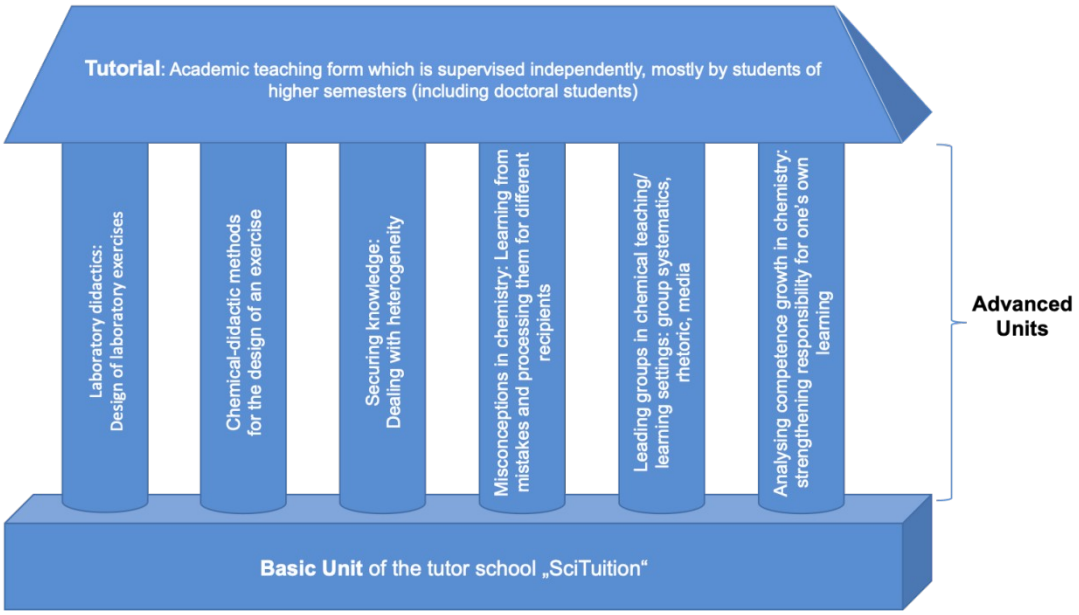

Figure 1: Concept of a tutor school for university education in chemistry.

3. Construct of a Basic Unit

The basic unit of the tutor school "SciTuition" aims to pursue the primary learning objective of changing the role perception of tutors, in this case from the knowledge mediator to the learning guide. As described above, this is the main challenge, so that a student-centered teaching style can be developed instead of imitating the lecturer-oriented teaching style. In order to ensure this, the basic unit was planned in individual modules in order to customize the course concept adaptively according to the learning group, such as the training of students with teaching experience as well as those with little to no experience. In addition, the modular design makes it easier to pick up contents of the basic unit during the advanced units.

The basic unit is currently being tested with five modules (see Figure 2). The individual modules are pursuing the following goals:

(1) Clarifying the understanding of the tutors' roles.
(2) Facilitating a change of perspectives between the different roles.
(3) Getting to know and experiencing student-centered teaching/learning methods.
(4) Imparting relevant didactic aspects (such as the Johnstone Triangle).
(5) Refining the ability to analyze characteristic types of students in order to highlight the importance of classroom management.

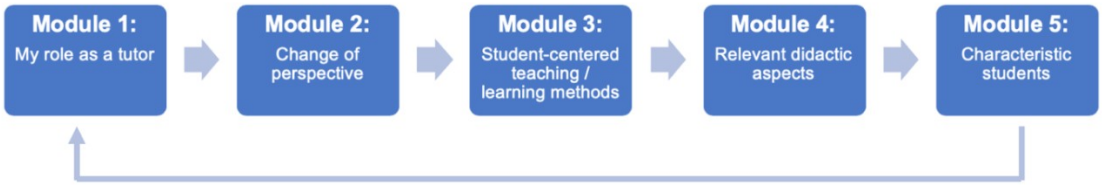

Figure 2: The schematic structure of the basic unit for the tutor school "SciTuition".

All in all, the five modules are to be understood in a circular process, whereby at the end of the course the understanding of the role should be taken up again. This is intended to provide a concluding reflection on the student's own understanding of tutoring and their significance as a learning guide. In order to induce this process of understanding, the participants should first deal with the role of a tutor (module 1). Afterwards, the participants should broaden their perspectives by becoming aware of problems and difficulties that students may face in the tutorial (module 2). In order to counter these problems, student-centered teaching and learning methods should be presented, which the participants can use in their tutorials (module 3).
Via these methods, the tutors can guide the students in their process of learning more effectively, thus stimulating a more sustainable learning success. In addition, basic didactic aspects, such as the Johnstone Triangle, are brought to mind to highlight the subject-specific challenges of teaching in chemistry (module 4). These are supplemented by further challenges through addressing various characteristic students which may occur in a tutorial (module 5). The participants should develop possible options which they can apply to deal with the characteristic students in their own tutorials. The developed ways of handling such students should dispel fear of difficult situations and enable tutors to appear more self-confident in the tutorial.
During the course of the training, various evaluation tools are used to provide feedback on the individual modules and to encourage participants to reflect. The instruments used include, for example, the ticking of statements concerning the individual modules or show of hands regarding the use of methods to collect quantifiable data. Furthermore, open questions are asked in order to generate ideas for the further development of the training, but also to identify and discuss the concerns and fears of the participants. In the following, exemplary statements of the evaluation of the primary learning objective (changing the role perception of tutors → from knowledge mediator to learning guide) are presented.

Mentioned characteristics of a tutor **before** the course	Modification to characteristics of a tutor **after** the course
Preparation of tasks	Promote group dynamics
Respond to and answer questions	Ask students questions
Motivated	Recognize and counteract problems
Specialist knowledge	Person of trust
	Adaptability

Table 1: Exemplary evaluation results for the primary learning objective.

It can be seen that, especially after attending the course, the mentioned characteristics are supplemented by aspects which take up the perspective of the students. This reinforces the assumption that taking on the role of learning guide can be simplified and promoted. For example, the specialist knowledge mentioned before the start of the course is supplemented with adaptability, which makes it clear that the specialist knowledge should be adaptively taught.

4. Conclusion and Outlook

During the course it became clear that the participants often assumed that they have to act as knowledge mediators. The course topics can help to ensure that the tutors perceive themselves as learning guides instead. The individual modules can help the participants to better understand their role as tutors and to broaden their perspectives. Both becoming aware of individual competencies and experiencing student-centered methods can help participants to better implement learning at eye level in a

peer-to-peer environment. Both didactic as well as group-specific challenges can be worked out during the course and constructive approaches to solutions can be developed.
In follow-up studies, further evaluation data will be collected and examined in order to be able to clarify quantifiable statements regarding the change of the role understanding of tutors through training as well as the expectations of students towards the tutors. In addition, advanced units will be evaluated in order to guarantee a holistic concept regarding the professionalization of the tutors.

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