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Cross-year peer-assisted learning using the inverted (“flipped”) classroom design: A pilot study in dentistry

Cross-year-Peer-Assisted Learning im Inverted-Classroom-Szenario: Pilotprojekt aus der Zahnmedizin

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ABSTRACT

Background: The inverted classroom model (ICM) represents a special combination of online and attendance learning. The implementation of the didactic concept of “peer-assisted learning” (PAL) within an ICM design has not yet been described in the literature for the field of restorative dentistry.
Objective: It was the goal of the present study to develop an ICM offering in a cross-year PAL format (ICM-cyPAL), and then introduce and evaluate it.
Method: The pilot project was conducted at the dental clinic at the Goethe University of Frankfurt/Main, where following its conceptual development and implementation with three consecutive cohorts of students in their first clinical semester (the sixth semester at university) the ICM-cyPAL offering was evaluated. Data on acceptance, tutor effectiveness, group interaction models and learning strategies were collected using an evaluative instrument.
Results: 121 students (tutees) participated in three cohorts. The response rate reached 98.3 %. In total, the offering was given an average rating of 6.97 ± 1.93 (from 1 = unsatisfactory to 10 = excellent). As the tutees explained the attention that the tutors employed gave to the group was “just right” (4.65 ± 1.04; where 1 = too controlling and 4 = just right to 7 = left the group on their own too long) and talked “just the right amount” (4.54 ± 0.95; where 1 = too much and 4 = just right to 7 = talked too little). The results for tutor effectiveness reached values between 3.26 ± 0.94 and 3.78 ± 0.87; for the evaluation of group interaction models average values were obtained from 3.41 ± 0.98 to 3.89 ± 0.73 (on a Likert scale of 1 = do not at all agree to 5 = completely agree). Concerning the surveyed learning strategies, the dimensions of “resource management” and “implementation of the learning materials” were given the highest and lowest rankings, respectively.
Conclusion: The tutees’ ratings of the newly developed and implemented ICM-cyPAL offering in the dental context were mainly positive. The thematic orientation of the structured training program needs to be optimized. The offering itself requires both a high degree of organization and solid financial and staffing resources.

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ZUSAMMENFASSUNG

Hintergrund: Das Inverted-Classroom-Modell (ICM) stellt eine besondere Kombination zwischen Online- und Präsenzlernen dar. Die Implementierung des didaktischen Konzepts des „Peer-Assisted Learning“ (PAL) innerhalb eines ICM-Szenarios ist bis dato im Fach Zahnerhaltungskunde nicht in der Literatur beschrieben.
Fragestellung: Ziel der vorliegenden Studie war es, ein ICM-Angebot im Cross-year-PAL-Format (ICM-cyPAL) zu konzipieren, einzuführen und zu evaluieren.
Methode: Das Pilotprojekt wurde an der Zahnklinik der Goethe-Universität Frankfurt am Main durchgeführt, indem nach der Konzeption und Implementierung bei drei aufeinanderfolgenden Kohorten Studierender in ihrem ersten klinischen Semester, dem sechsten Fachsemester, das Angebot des ICM-cyPAL evaluiert wurde. Daten zur Akzeptanz, Tutoreneffektivität, Gruppeninteraktionsmuster und Lernstrategien wurden mittels eines Evaluationsinstrumentes erhoben.
Ergebnisse: In den drei Kohorten nahmen 121 Studierende (Tutees) teil. Zur Evaluation wurde eine Rücklaufquote von 98,3% erreicht. Als Gesamtbeurteilung für das Angebot wurde im Mittel der Wert $6{,}97 \pm 1{,}93$ (von 1 = ungenügend bis 10 = exzellent) vergeben. Die Tutees gaben an, dass die eingesetzten TutorInnen sowohl „genau richtig“ die Gruppe betreuten ($4{,}65 \pm 1{,}04$; wobei 1 = zu bestimmend über 4 = genau richtig bis 7 = ließ die Gruppe zu sehr laufen) als auch „genau richtig“ redeten ($4{,}54 \pm 0{,}95$; wobei 1 = zu viel über 4 = genau richtig bis 7 = zu wenig geredet). Die Ergebnisse zur Tutoreneffektivität ergaben Werte zwischen $3{,}26 \pm 0{,}94$ und $3{,}78 \pm 0{,}87$; zu den evaluierten Gruppeninteraktionsmustern wurden Werte im Mittel zwischen $3{,}41 \pm 0{,}98$ und $3{,}89 \pm 0{,}73$ (auf einer Likert-Skala von 1 = stimme gar nicht zu bis 5 = stimme voll zu) vergeben. Bei den abgefragten Lernstrategien gab es die höchsten Bewertungen für die Dimensionen des „Ressourcenmanagements“, die niedrigsten für die „Implementation“ des Lernstoffs.
Schlussfolgerung: Das neu konzipierte und implementierte ICM-cyPAL-Angebot im dentalen Kontext wurde seitens der Tutees hauptsächlich positiv evaluiert. Optimierungsbedarf besteht im Hinblick auf die inhaltliche Ausrichtung der strukturierten Schulung. Das Angebot an sich erfordert einen hohen Organisationsgrad und eine gute personelle bzw. finanzielle Ausstattung.

Introduction

The didactic concept of “peer-assisted learning” (PAL) has proved valuable for many years in dental training and can find its application [1–4] in various designs. Diverse variations [5,6] exist within the PAL format. For example, according to the educational level the student tutors find themselves in related to the fellow students (tutees) they are instructing, the terminology includes “same-year PAL,” “cross-year PAL” or “near PAL” [5,7,8]. A “near-peer” relationship stands in contrast to a “cross-year” if the trainers (tutors) and the trainees (tutees) in regard to their educational level are separated by less than one year [8].

The term “cross-year” is accordingly used when both are separated by more than one year. A conclusive, internationally explained and valid nomenclature for the individual possible forms of peer relationships, whether these are related to year of study or semester, is not available. The literature describes how structured training by the tutors takes on an especially important role in PAL. It is recommended that these should be conducted by experienced teaching personnel (docents, mentors), since only in this way do the tutors have the necessary preparation in competence for their work in comparison to their fellow students [5].

PAL can be used both in attendance and for online offerings [9,10]. The flipped-classroom (or inverted-classroom) model (ICM) [11–16] represents a special combination of online and attendance learning. The implementation of the ICM model has already been described both in dentistry and medical studies [17–20]. This involves a particular kind of blended learning offering, whereby a self-study online phase (individual phase) is employed before the attendance phase [12,13]. In the online phase, factual knowledge is used as a rule, which serves as a foundation for the attendance phase. The attendance phase should subsequently be used for deepening the learned knowledge and applying it [12]. Previously, in a traditional setting of lecturing or attendance instruction, factual knowledge has been used in instruction and participants had to deepen and possibly apply this knowledge at home [12].

ICM now switches the assignment of respective tasks to individual phases [12]. The advantage here is the promotion of active learning [12]. In the self-study phase and the in-depth discussion in the attendance phase, aspects of active learning (e.g., teamwork, debate, and self-reflection) are encouraged [12]. Active learning increases learning success, motivation, and positive attitudes, and promotes higher cognitive learning processes, problem-solving competence, and critical engagement with the training content [12]. Thus, care should be taken that the trainees avoid repeating the content of the online phase in the attendance phase.

The course participants must understand that independent preparation for the attendance phase represents a central part of the concept [12]. In the attendance phase, group methods such as partner work, group discussion, problem-based learning (PBL), think-pair-share, active plenum, buzz group, or snowballing, etc., can be implemented [12,21]. Active, self-directed learning is the central point of the offering. This has been often examined in various designs and described as a theoretical construct consisting of multilayered models [22,23].

The offering of an ICM design in the context of dentistry at the Goethe-University in Frankfurt am Main, which combines online self-study phases with subsequent attendance instruction in the form of PBL, has recently been cited by the German Rector’s Conference as an example of Good Practice [12]. The PBL offering of the same institution was also examined with regards to acceptance, observed tutor effectiveness and group interaction models [24,25]. This offering is based on a docent-centered setting and was conducted by experienced dentists who have been active in teaching for a long time.

The distinctiveness of the further-developed ICM design described by *Tolks* [12] of the Frankfurt dental clinic lies in its PAL-based performance. Cross-year peer tutors, who were prepared for their activities in structured training before and afterwards, take their roles as learning facilitators seriously. The docents take on mentoring tasks to support the peer tutors during their active work as learning facilitators.

It is the goal of the present work to present an evaluation of the students in the previously described situation of the ICM-cyPAL design. It is the first publication of this kind to be evaluated within the context of dentistry research. It is different from

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