3rd International Conference on Higher Education Advances, HEAd'17
Universitat Politècnica de València, València, 2017
DOI: http://dx.doi.org/10.4995/HEAd17.2017.5214

LearnTeamPlenum –

A Pragmatic Approach for Inverted Teaching

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Abstract

The paper proposes a new teaching approach, that combines ideas from just-in-time-teaching (JiTT) and the inverted classroom (IC). It has been adapted from the LearnTeamCoaching. In comparison with other inverted teaching scenarios, it requires less preparation effort on the instructor side, i.e. no videos and no intensive just-in-time preparation. The students are asked to investigate the subject autonomously using provided papers and the Internet. In the common lecture – the plenum - the reflection of the learning matter is based on student's questions and posters that have been prepared as a result of the investigation. The plenum is moderated by the students. The paper introduces the method and provides details regarding the experience gained during its fourfold application at the HTW Berlin in the study program computer science and business administration. In the end, the application of the method for different subjects and different organizational settings is discussed.

Keywords: *inverted classroom, just-in-time-teaching, teaching experience, competency-based learning*

1. Introduction

Just-in-Time Teaching (JiTT) and Inverted Classroom (IC) are activating teaching methods that are very popular in today's university education systems. It is widely agreed that the activation of students enables the development of skills that are conducive to professional success. The idea of IC (e.g. Lage et al. 2000, Bergmann and Sams 2008) and JiTT (e.g. Novak et al. 1999, Henderson and Rosenthal, 2006) is, that the students prepare the content before the actual lesson at home (in IC with videos, in JiTT with provided readings) and the common classroom time is actively used to discuss and apply the learning matter. The classical lecture-example-homework cycle is left in order to earn a more learner-centered classroom. The students are able to work through the provided material on an individual basis, adapted to their own learning style and speed. They are asked to answer related questions and submit questions that arose when studying the provided material. In JiTT the results enable the instructor to prepare the lesson (just-in-time) according to the students needs. The common classroom time (mostly conducted by the instructor) is then used to deepen the understanding and to discuss and answer the open questions.

In this paper we introduce a teaching method that takes advantages from the IC repertoire as well as JiTT. The introduced method is called LearnTeamPlenum (LTP). It variegates the JiTT process as it leaves even more responsibility to the students, which also have to moderate the clearing process in the common lecture. The design of the common lecture is inspired by the IC method as described in (Spannagel & Spannagel, 2013).

The LTP method is a continued development of the LearnTeamCoaching (LTC) – an approach introduced by (Fleischmann et. al. 2003). We will first sketch the learning process in the original LTC approach and then describe adaptions that have been made to keep the effort on the instructor side manageable for one person.

LTC is structured into three phases: learn, team, and coaching.

1. **Learning:** The students work autonomously. They use a provided script to acquire the learning matter and are asked to apply their knowledge in small tasks. During the learning process the students are asked to reflect their knowledge by answering attendant questions and solve small tasks. Problems should be made explicit by formulating suitable questions.
2. **Team:** In the second phase, the students meet in their team, mutually propose their solutions and discuss the open questions. Questions that can't be answered in the team are collected in a common question pool.
3. **Coaching:** In the last phase, every team meets the instructor. The meeting always follows a given agenda and covers the assessment of learning success, the answering of open questions and a feedback reflecting the method. The agenda of the coaching session is described in Figure: 1.

It is important to note, that the responsibility for the coaching session is shared between the instructor and the team. The students take in turn different activities like the moderation, the time management, the question pool tracking and the protocol. This way the students take an active role in the learning process and also acquire further competencies.

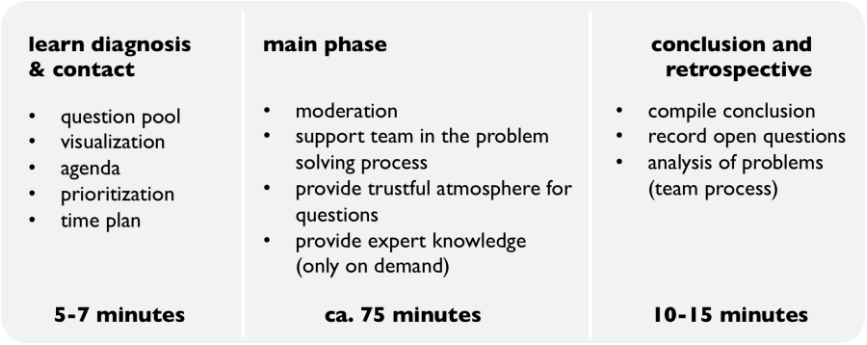

Figure: 1 Agenda of the LTC- coaching session

The method is very flexible and can be used in various different settings. (Fleischmann et. al. 2003) describes its application in an industrial engineering lecture. Here the normal alternation of lecture and tutorial was completely replaced by the LTC-process. The lessons were distributed as follows: phase1 (learning) was given as homework. For the second phase (team) 2 x 90 minutes with time and (individual) team room were provided. For the third phase (coaching) again a 90-minute unit was spent. This means that the whole content oft the course was put across via the LTC method. The assessment was done using a normal written examination. The authors described the use of the method as very successful. „The students have been able to acquire most of the content either on their own or in the team - [...]. They admitted to learn more sustainable and to reach the same progress in a smaller amount of time." The method acknowledges the different skill levels and different learning types and forces the acquiring of knowledge on different competence levels. The students not only listen to the lecturer but also have to acquire the content themself and present and explain it to each other. In the coaching session further competencies as presentation and moderation skills are practiced. The major critic from student side was the time effort. To neutralize the used time the authors recommend to shorten the content where applicable. For the lecturer the application of the LTC-method enforces more presence. Instead of the three lessons per week, they have to organize and perform one coaching session per team. Further effort arises with the preparation of the material. In the described setting the scripts and tasks have been explicitly created in order to cover exactly the corresponding learning matter.

2. Adaption of the method: LearnTeamPlenum

Inspired by the idea to increase the involvement of the students (Mason et al. 2013, Chi et al. 1994, Gannod et al. 2008) the author decided to adapt the LTC method, as it did not require to have videos in place. Still the method was appraised to be very time-consuming for one lecturer. Therefore it was looked for an adaption, such that the method could be transferred to a normal lecture format (90 minutes lecture + 90 minutes tutorial). In fact, all three phases are used, but the coaching is not performed with single teams, but with the whole course (max 40 students). According to inverted classroom terminology, c.f. (Spannagel and Spannagel, 2013), the new format is called plenum. The 3 phases are modified as follows:

1. **Learning:** Instead of a prepared script the students get the task to investigate a certain topic. Relevant literature or helpful links are provided. In addition questions and exercises are given, that have to be answered / solved in order to internalize the learning matter. Problems should be made explicit by formulating suitable questions.
2. **Team:** In the second phase, the students meet in their team, present each other the solutions and discuss their approaches and problems. Questions that cannot be solved are gathered in a common question pool. Additionally to the primary setting, the students are asked to visualize the subject on a flipchart poster.
3. **Plenum:** The time of the lecture is used to meet all participants. The moderation of that session is delegated to one of the teams. The event starts with a poster session, where all participants look at the different posters (all covering the same subject). All students are asked to note their questions on moderation cards. The questions either stem from the prepared question pool or denote unclear aspects found on other posters. The moderating team collects the cards. Together with the audience they are clustered and prioritized in front of the class. The main time is now used for answering the questions. All students prepared the subject. So all students are addressed. The instructor only interacts, if needed. The plenum ends with a method review. Every team is asked to reflect the teamwork and to generate ideas to improve the next round. Finally, the part of the moderating team is regarded. The team appraises itself and gets feedback from the audience. The agenda of the plenum is described in Figure: 2

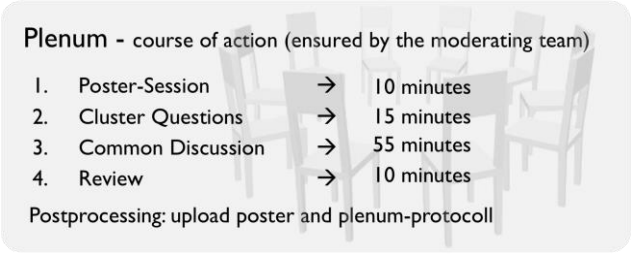

Figure: 2 Plenum. Course of actions

2.1. Details of the Application

The LTP method has been applied in the usability course of the BA-program „computer science and business administration“ of the HTW Berlin. In 2016 it has been used for the fourth time, c.f. (Siegeris & Krefting, 2014). The following paragraphs explain the adaption in more detail and contain hints gained within the last four years of application.

Frequency

In order to reduce the time needed, it is recommended to alternate the LTP units with normal lectures: first week poster preparation and plenum, in the next week normal lecture and tutorial. At the HTW Berlin, the group of all six-semester students (mostly between 30-35) had been subdivided into 5-6 teams. Every team had to prepare a poster every second week and to moderate at least one plenum-session.

Assignment task and poster preparation

Applying this method, it is not necessary to provide a video or a script for the preparation. Instead the students are asked to investigate a certain subject on the base of given questions. The investigation can be supported providing relevant resources, etc. web links or scientific papers. Formulating the questions, it is important to check, that the answers require more than a simple enumeration of facts, but force a deeper examination of the subject. In addition it is recommended to pose tasks that require to make a choice for a certain method and to apply it to a typical problem of the field. All the results have to be visualized on the poster. The students are asked to cite their literature and to provide interesting resources/links in a common Moodle directory.

For the poster preparation a whole 90 minutes block is granted. The students get flipchart paper and pencils. The task, to visualize the subject on a given size, requires the students not only to discuss their answers, but also to prioritize the content and to come up with a certain visualization strategy. The time limit for this complex assignment had the side effect, that the student came prepared. This is a well-known challenge in an inverted classroom setting, (Spannangel & Spannagel 2013). Figure: 3 shows two poster examples that visualize the subject accessibility.

Goal of the plenum and role of the instructor

In the plenum all the open questions should be answered. The moderation of that process is left to the students. To support the non-frontal character and the changed responsibilities, the seating arrangements are changed in the beginning in order to form a circle. The instructor is part of the round. She only interacts in case the discussion get stuck or to correct faulty assumptions. Still, from the perspective of the instructor, the plenum should be also an instrument to guarantee that all important facts and methods had been

communicated. Therefore the instructor should use the time of the poster presentation to note her own questions (asking for important or missing facts) on moderation cards and to join them into the set of question to be tackled during the discussion.

Figure: 3 Poster examples for subject accessibility

Assessment of the course

For the assessment of the course a normal written examination was used. The topics of the examination stemmed to the same extend from the LTP lessons and the normal lectures. The poster and the moderation had to be fulfilled in order to reach the admission for the examination. The weekly change of normal lecture and LTP required precise planning and coordination. Figure: 4 shows a mind map that has been used to support the communication with the students.

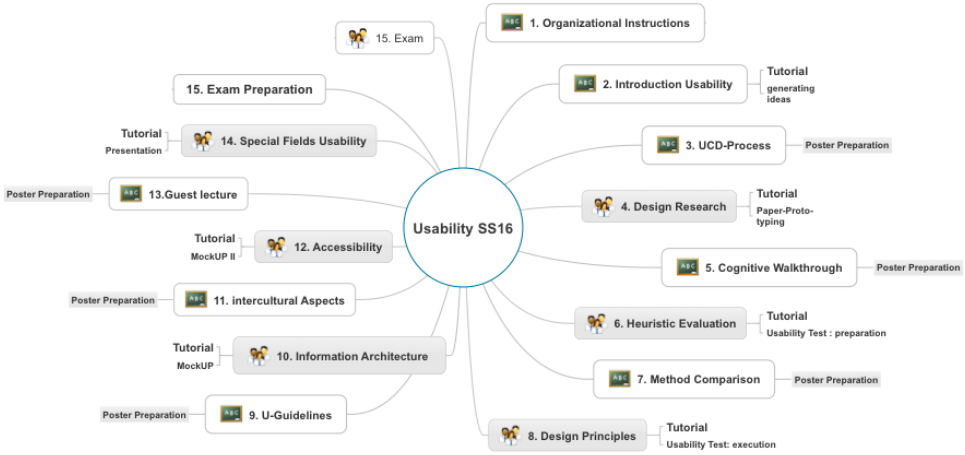

Figure: 4 Alternation of normal lectures (white) and LTP units (grey)

2.2 Evaluation

The whole course has been evaluated as very interesting and alive. The following student comments are representative samples: „very interesting and diversified didactical method." „The atmosphere during the discussion was pleasant and made it comfortable to join.", „I liked the interaction, that stimulated to actively participate." The main critic concerned the preparation effort, which was mentioned to be more time-consuming than in a normal course. Only at the exam preparation the effort could be recouped, because the LTP-topics were already internalized and had not to be learned again. Some minor concerns related to the coordination of the different lessons, which sometimes led to confusion about the current procedure.

3. Discussion and Summary

The LTP method was applied at a university of applied science in a computer science program. The student numbers are forty at maximum. A number of 30-35 students seem to be ideal. This results in a team size of 5-6 students and 6 LTP-cycles. Every team has to prepare six posters across the semester and to moderate one plenum. With more teams, respectively more posters, the effort would again increase. A weekly alternation of normal lectures (and normal tutorials) and LTP-cycles would be not possible as more time for the poster preparation would be needed. With more participants, also the plenum must be adapted, as a discussion in a circle would come to its limits. With the weekly change of the teaching mode, the instructor gets the possibility to decide which subject are suitable for self-study and which need explanation. Through this flexibility the method seems to be suited even for well-established lectures. Still the use in courses with changing content is suggested. Here it helps to reduce the effort and still guarantee up-to-date content.

The conversion of a lecture into the new format is less expensive than the application of other inverted techniques. In contrary to the LTC-method, the presence time is similar to that of a classical lecture. It furthermore needs no pre-phase as in typical IC-scenarios, where a video has to be produced beforehand. The experience shows that a similar scope as in a normal lecture could be covered.

Generally it can be said, that the format is very refreshing. The students bring new aspects and up-to-date content. The event is alive and the annual repetition does not get boring. A further advantage is the bigger appreciation of the students. They can focus on their demands and do not have to spent times on known content. In the plenum discussion they have the chance to show their expert knowledge. This can be very enriching for the whole group, especially if practical experience is presented. The main reorientation for the author was the change of the role, from presenting lecturer towards participant. It was unfamiliar to remain reticent and to trust onto the discussion. Still, it is a win-win situation.

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