

## How to Get to School, LAYA?

### Conducting a participatory design workshop to design and introduce an inclusive e-learning platform into secondary math classes

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**Abstract:** The authors' prior studies have revealed that it is difficult for some secondary teachers to conduct cooperative learning in math classes. This contribution suggests a workshop series to design a learning platform to support peer cooperation in diverse secondary school classes. Teachers collaboratively create the design in a joint venture with the authors. The usage of the grounded theory methodology in combination with a so-called Learning Study is an excellent fit for the conference's motto "education realities" and the workshop's inclusive theme. Four workshop sessions, with dedicated goals to narrow down the scope of the design and to eventually create it, are sketched out.

**Keywords:** participatory design; inclusion; diversity; computer-supported collaborative learning; learning study; grounded theory methodology

## 1 Introduction

This paper intent is to discuss a work in progress workshop series to participatory design an inclusive and collaborative e-learning platform and its introduction and usage in secondary maths classes in Germany.

Participatory design is a common practice for designing learning environments [Eh18]. Still, it has not been applied to develop a collaborative and inclusive technology-enhanced environment as far as the authors know. Even though it has been separately applied to the fields of collaborative learning [Ca00] and technology-enhanced inclusive education [Bo16].

## 2 Methodology

The workshop series is the second stage within a three-staged research project. The overarching goal of the project is to investigate the success conditions of computer-supported collaborative learning (CSCL) in inclusive learning.

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The first stage gathers exploratory data to map out the circumstances in the field and to narrow down the scope of the design. There was no a priori knowledge about the structure of the specific classes available (i.e., what needs do the students have and how does it affect classic cooperation or computer-supported cooperation during course?). A critical insight based on two interviews from this stage is that it is more difficult for teachers to conduct cooperative learning during math classes than during their other subjects, which they explain to themselves with the emphasize on adaptive or individualized learning in math classes. Early results of the first stage are published in [CP20]. A teacher suggests two design ideas. First, collaboration supporting technology has to be adaptive. Second, an inclusively designed information pool to accompany the cooperation process and the gained knowledge during conduct could be helpful for all students and especially for those with special needs.

This study focuses on secondary school students because they should have some experience in collaborative learning and should not be that irritated if the medium is varied.

The third stage will be the evaluation of the design during the participants' math classes. This evaluation is out of scope for this paper.

The methodological framework for these three stages is the constructivist grounded theory methodology (GTM) constituted by Kathy Charmaz [Ch14]. It perfectly fits the requirements of the development process to get a stakeholder-informed PD, and it is an adequate methodology for filling gaps in preliminary theories. GTM is also established in the human-computer interaction field [LFH17]

### **3 The application of a Learning Study to elicit requirements for a learning software**

It was Ference Marton, who developed a pragmatic approach to in-service teacher training while leveraging practitioner's insights for research through a method called Learning Study [Ma15]. A Learning Study combines the approach of a lesson study with Design Research.

The workshop series will be conducted with teachers from the first stage, who opt into the workshop series. It will be an online workshop series, because of the participant's physical distance ranging from western Lower Saxony to Berlin via Schleswig-Holstein and because of the COVID-19 pandemic. The series is intended to be divided into four sessions two for requirements analysis and two for preparing the application of platform during the teachers' classes.

There are amendments and specifications made for the Learning Study. The guiding question for the series will be ``How to technologically support peer cooperation during

inclusive math classes?". The workshop series is planned for five teachers creating a buffer for potential dropouts.

A suggested high-level plan (i.e., goals for each session) for the series is:

- specification of one inclusive focus and creation of student personas.
- creation of technologically and pedagogically sound designs to support these personas.
- discussion of a prototype and preparation of the introduction to the own class.
- preparation of a lesson using the prototype.

The reduction to one focal point of inclusion (e.g., learning difficulties, language or a specific disability) is necessary to make the study feasible. Then, the teachers will collaboratively create personas based on their knowledge about their students. During the first workshop, the availability of different media and the digital literacy of the participants is assessed.

The next step will be the participatory and collaborative design of technological supports. It is challenging to anticipate possible design outcomes at the time of writing because it one hand it depends on the chosen inclusive focus and on the other hand on the earlier mentioned difficulties of peer cooperation in math classes. Likely, one or both design ideas mentioned above are further developed.

After that, a prototype of this design will be implemented for three months. Then, the prototype will be discussed and further refined during the 3rd workshop, and the introduction into the teacher's classes is prepared. Last but not least, the actual lesson using this prototype is planned.

The workshop series will be much work for the participating teachers. Thus, it is intended to give them certificates of attendance, which may be used to show their training efforts.

## 4 Conclusion

This contribution shows how to approach a participatory design with secondary teachers to improve their students' cooperation while taking special needs into account.

There is still work to do. Some information is not known a priori (i.e., which particular need will be focused?) and is there a way to even reduce complexity in before? It seems to be adequate to opt for an online format to conduct the workshop series to cope with the COVID-19 pandemic, and it is implications for all stakeholders. However, are there unforeseen side effects, and how will it affect the actual conduct of the lesson (i.e., remote vs on-site teaching)?

The still ongoing data analysis of the first stage shows the emergent trend that peer cooperation remains extraordinarily complicated in math classes compared to other

subjects. Is it a subject-specific phenomenon? Furthermore, what are its implications for the design and the design process?

Finally, it is not yet possible to tell how the design might be evaluated until the actual particular need is known.

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