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— CHAPTER 4 —

Teacher educators' design and implementation
of group learning activities

Chapter 4 Teacher educators' design and implementation of group learning activities³

In this chapter is described how teacher educators design and implement group learning activities to empirically validate the Group Learning Activities Instructional Design (GLAID) framework. Interviews with 23 teacher educators were analysed to acquire an in-depth understanding of how they design and implement group learning activities. The conclusion is that teacher educators use all the components of the framework. They report difficulties with structuring group learning activities. Only nine teacher educators mentioned the facilities component. The findings are discussed and the usefulness of the GLAID framework for teacher education is commented upon.

³ This chapter has been accepted in adapted form as: De Hei, M. S. A., Sjoer, E., Admiraal, W. F., & Strijbos, J. W. Teacher educators' design and implementation of group learning activities. *Educational Studies*.

4.1

Introduction

'I try to visualise the process of collaborative learning activities. I explore what I want to achieve with it. Then I search for possibilities to attain the goals. And I try to develop options for students. I mean that they can choose various ways of working on a group assignment. Some students love to dive into the literature, while others use their experiences, want to experiment with teaching in schools and, based on that, search in the literature. I think it is essential that those options are available. But I also reflect on the learning materials that need to be available for the collaborative learning activities.'

(I4, D)

In teacher education, group learning activities (GLAs) are an important instructional method, because they can lead – if properly applied – to multiple learning benefits, such as knowledge and skill acquisition (Janssen, 2014). Furthermore, GLAs can contribute to the motivation of students (Järvelä, Volet, & Järvenoja, 2010), prepare students for working in teams (Kluth & Straut, 2003), and demonstrate to students how they can implement group work in the future as teachers (Ruys, Van Keer, & Aelterman, 2010).

To implement curricula, and, therefore, also to implement GLAs, a proper design is necessary (i.e., Van den Akker, McKenney, Nieveen, & Gravemeijer, 2006). Teachers in teacher education design and implement GLAs on a regular basis, and think about the design, as illustrated in the quotation above from a teacher. However, group work does not always lead to the desired outcomes (Fransen, Kirschner, & Erkens, 2011; Gros, 2001; Hmelo-Silver, 2004; Janssen, 2014). Teachers consider the design of group learning activities as a challenging task and express the need for more support in the design and implementation in order to enhance the learning benefits of GLAs (De Hei, Strijbos, Sjoer, & Admiraal, 2015; Gillies & Boyle, 2010; Ross, Rolheiser, & Hogaboam-Gray, 1998). In their thematic review De Hei, Strijbos, Sjoer and Admiraal (2016) noticed that various approaches for the design of GLAs are presented in the literature. They synthesised fourteen approaches from the literature, and described in their synthesised framework eight major components for the design of GLAs. They refer to these components and their alignment as the Group Learning Activities Instructional Design (GLAID) framework. The aim of the GLAID framework is to guide teachers in designing and implementing GLAs. The objective of the current study is to describe how teacher educators design and implement GLAs and to match their considerations with the GLAID framework.

The GLAID framework consists of eight design components: (1) interaction, (2) learning objectives and outcomes, (3) assessment, (4) task characteristics, (5) structuring, (6) guidance, (7) group constellation, and (8) facilities. The interaction component refers to the process of collaboration itself, whereby students strive to attain learning objectives by being involved in social, cognitive, and metacognitive activities. In the learning objectives and outcomes component, teachers can decide on objectives for GLAs regarding declarative and procedural knowledge and/or social skills they expect to lead to desired learning outcomes. The assessment component concerns the measurement procedures used to assess the attainment of learning objectives. The task characteristics component refers to decisions on the (sub-) activities that students have to perform to attain the learning objectives. The structuring component refers to how the process of collaborative interaction is structured in order to guarantee positive interdependence and individual accountability.

In the guidance component, teachers decide on which undertakings are needed – performed by persons or computer software – to guide students through the process of a GLA. The group constellation component refers to group composition as well as to group size. In the facilities component, teachers address all supporting materials, virtual and physical, that facilitate collaborative interaction and activities in a GLA.

Another major aspect of the design of GLAs that is addressed in several approaches is the alignment between the different components (Dennen & Hoadley, 2013; Strijbos, Martens, & Jochems, 2004) and between the different curriculum levels: the intended, implemented, and evaluated curriculum (Reigeluth, 1999; Van den Akker et al., 2006).

To shape these two kinds of alignment, De Hei et al. (2016) used the ADDIE model, consisting of five steps, of which steps 2, 3a, and 3b are addressed in the GLAID framework: (1) *Analyse* the learning environment (the learning environment of the GLA includes the learners' characteristics, teachers' characteristics, curriculum characteristics, and collaborative premise: why students need to work in groups and not individually); (2) *Design*: the learning objectives, the interaction, and the assessment; (3a) *Develop* instructional strategies: the task characteristics, the structuring of the collaboration, the guidance, and (3b) *Develop* logistics: the group constellation and the facilities; (4) *Implement* the design; and (5) *Evaluate* the design. The design steps require both a linear way of working, using a particular sequence, and a cyclical way: the designer continuously checks whether his/her decisions are in line with all the previously designed components and decisions. The GLAID framework is summarised in Table 1.

The GLAID framework is meant to be a comprehensive design approach, which is grounded in the literature on GLAs. However, research is needed to empirically validate whether this framework responds to teacher's design practices and can contribute to better GLA design and thus enhance the attainment of the desired learning outcomes. Therefore, the following research question has been formulated: 'How do teacher educators design and implement GLAs, and to what extent do their considerations match with the GLAID framework?'.

Table 1 The Group Learning Activity Instructional Design Framework

Step 1: Analyse	Determine Student characteristics		
	Determine Teacher characteristics		
	Determine Curriculum characteristics		
	Determine Collaborative premise		
	Determine Global goals		
Step 2: Design	Interaction	Learning objectives and outcomes	Assessment
Step 3: Develop			
Step 3a: Develop Instructional Strategies	Task characteristics	Structuring	Guidance
Step 3b: Develop Logistics	Group constellation	Facilities	
Step 4: Implement	Monitor the instructional process		
Step 5: Evaluate	Evaluate the processes and outcomes		

4.2 Method

4.2.1 Participants

Twenty-three teachers in Teacher Education Programs (primary school) of six Universities of Applied Sciences in the Netherlands volunteered to participate: 13 males and 10 females. Ages ranged from 22 to 63 years ($M = 45.9$, $SD = 11.5$), and years of teaching experience ranged from 1 to 23 years ($M = 9.8$, $SD = 6.1$). These participants use group learning activities on a regular basis in their face-to-face teaching practice. In the quotations of the results numbers are used for the teacher educators (1-23) and characters for the teacher education departments (A-E).

4.2.2 Data collection

Individual face-to-face semi-structured interviews were administered covering the following topics: (a) the design of GLAs, (b) the implementation of GLAs (the experiences of teacher educators with students working on GLAs), and (c) the evaluation of the implementation of GLAs and the learning outcomes in relation to the designed learning objectives. The interviewees were not familiar with the GLAID framework, and were not informed about the framework and its components. In Table 2, the interview questions are presented.

4.2.3 Analysis

The interviews were audio-recorded and transcribed. The transcribed interviews were carefully read and reread by the first author. The transcribed interviews were then subjected to selective coding, which was guided theoretically by the components of the GLAID framework. It was also coded whether teacher educators addressed the alignment between those components.

Next, all identified statements that included the specific design component(s) and the kind(s) of alignment between each of the components were summarised. In order to guard against preset interpretations, the second author checked the coding and all results were discussed until agreement (cf., Marble, 1997).

Whether the considerations of teacher educators match the structure of the GLAID framework was based on the proportion of teacher educators describing a particular component, with 50% as a minimum. The GLAID framework only concerns steps 2, 3a, and 3b of the ADDIE model. Therefore, the alignment between the design and the learning environment (step 1), the implementation (step 4), and the evaluation (step 5) was not part of the analyses.

Table 2 Interview questions

Themes	Questions
The design of GLAs	Do you design your GLAs yourself? How do you work on those designs? Do you include learning objectives regarding the collaboration of students? Do you have any questions regarding the design of GLAs? The last GLA you designed: how did this design come about? Was it a new design or did student work on this GLA before? If students worked on this GLA before, which adaptations did you make regarding the original design?
The implementation of GLAs	How do you implement GLAs in your lessons? How often are students allowed to work collaboratively during your lessons? Do you use short term (one lesson) or long-term (more than one lesson) collaborative assignments? How do you value the collaboration between students? What problems do you experience in the collaboration of students in GLAs?
The evaluation of the implementation of GLAs and the learning outcomes in relation to the designed learning objectives	Why do you use GLAs in your courses? Do GLAs lead to the desired learning outcomes? How do you value the learning outcomes of students in GLAs regarding domain knowledge or cognition? How do you value the motivation of students during GLAs? Do you experience a difference in motivation compared to students working on an individual assignment? How do you evaluate the conversation of students working on a GLA?

4.3 Results

Table 3 shows how many teacher educators mentioned a particular design component of the GLAID framework.

Table 3 Number of teacher educators who mentioned specific GLAID components

Interaction	22	(96%)
Learning objectives and outcomes	23	(100%)
Assessment	14	(61%)
Task characteristics	22	(96%)
Structuring	18	(78%)
Guidance	18	(78%)
Group constellation	17	(74%)
Facilities	9	(39%)

Seven components were described by a majority of the teacher educators. The component facilities was mentioned by only nine teacher educators. The following section describes the results of the interviews in more detail, and specifically how teacher educators design and implement their GLAs, first per component and then with respect to the alignment.

4.3.1 Components of the GLAID framework

4.3.1.1 Interaction

The interaction between students in GLAs as described by the teacher educators consists of the following: (1) sharing information, such as mathematical procedures, theory they have just learned, opinions, ideas, and arguments; (2) helping and supporting each other, such as giving feedback on each other's lessons to pupils and explaining learning content to others; and (3) interaction about the process of collaboration, such as conversations about how to fulfill agreements, to address free-riders about their behaviour, to divide tasks and responsibilities, to refrain from pushing one's individual needs/ideas, and to give (subtle) feedback on each other's behaviour.

An example of a statement about interaction, such as sharing information using content-related arguments and underpinning feedback with learning content, is the following:

'They had to read those articles beforehand about four opinions, so they started using arguments to convince other students from what they learned from those articles. And they asked each other: what makes you think that way? And where does your opinion come from? So then you notice that those conversations arise, and from that a very nice compromise develops. [...] but the idea is that they really exchange what they learned.' (7, A)

A major problem with the interaction between students is stressed by five teacher educators: they observe too little depth in the interaction. Examples given by the teacher educators that could cause this lack of depth are the following: (1) students trying to reach agreement on the division of tasks in as little time as possible, (2) students interacting too little about the task and the learning content (for example, using their interaction time to talk what they did during the weekend), (3) students being too positive in their feedback, being reluctant or afraid to be critical of each other, and (4) students not proceeding with posing further questions to other students, being too easily satisfied with the initial answers given by their peers.

4.3.1.2 Learning objectives and outcomes

In their decisions about learning objectives for GLAs, teacher educators referred to course documents that already exist and have been written in previous years by other teacher educators or educational designers. As a consequence, they do not set the objectives for GLAs themselves; these are predetermined in the curriculum. Some teacher educators formulate objectives they wish students to attain, in addition to the objectives already described in the curriculum. None of the teacher educators indicates that students are involved in the setting of learning objectives.

Teacher educators define group objectives as well individual objectives for GLAs. Examples teacher educators mentioned as group objectives are to work on a final product, such as the group presentation of a lesson cycle for a primary school class, and to work towards shared knowledge construction, such as reading one chapter each from an extensive book on biology education and sharing what they have read and know in order to build shared knowledge on the topic. Teacher educators referred to three kinds of individual objectives: (1) knowledge, (2) social skills, and (3) skills students need for their future profession.

Teacher educators mentioned various learning objectives regarding knowledge: to expand domain-specific knowledge such as mathematical knowledge and skills, to relate knowledge in various domains, to deepen knowledge in a specific domain, to experiment with materials (e.g. to gain insights into physical processes such as the density of liquids), and to link knowledge to educational practice (such as learning styles and teaching in primary school). Social skills as learning objectives were also emphasized. For example, one teacher educator mentioned:

'In certain domains, you go beyond just cognition. It [red. collaborative learning] calls for social skills, waiting your turn, learning to respect each other's opinions.' (14, D)

Other specifications of learning objectives regarding social skills were to learn to debate and to discuss, to develop empathic skills, to learn to respect each other's opinions and views, to learn how to give critical and subtle feedback, and to learn to use each other's qualities and skills. The teacher educators disagree on whether objectives regarding social skills should be set explicitly. Three teacher educators reported that they do not set objectives for social skills, but in their guidance of students they do emphasize the importance of acquiring social skills. Another teacher educator mentioned being aware that social skills are learning objectives in the design, but does not pay any attention to those learning objectives when implementing a GLA design.

One teacher educator stressed the importance of considering why students should collaborate:

‘You have to think that through carefully [red. the kind of learning objectives], and that has a lot to do with the purpose and the reason you want them to collaborate.’ (20, E)

The third kind of individual learning objectives are related to the future profession of student teachers, such as acquiring knowledge about how to use GLAs in their practice as student teachers in schools, but also how to participate in teacher team in school and how to develop as a professional. Examples of learning objectives teachers mentioned for the future profession are: students need to learn how to learn and they can learn that, for example, through observing how their peers’ learning behaviour differs from their own learning behaviour, to become aware of how you behave in groups, to learn that different solutions exist to adequately solve a problem, and to learn to express one’s opinion in a group.

4.3.1.3 Assessment

Teacher educators mentioned several means of assessment, such as students’ individual learning journals, individual knowledge tests, collaborative reports, teaching in small groups in primary schools, or presenting products of group collaboration. Three teacher educators used two or more of these forms of assessment.

Four teacher educators reported that they use *assessment for learning* (formative assessment), three reported that they use *assessment of learning* (summative assessment), and one teacher educator combines these. Five teacher educators do not only assess the student work themselves, but use peer assessment as well. Two teacher educators also involve the students in the design of the assessment. For example, one teacher educator mentioned:

‘In some of our group learning activities students themselves stipulate the appraisal of their task.’ (22, F)

One of these two teacher educators requires the students, as part of the collaborative task, to design an assessment form for the presentation of their work. This form is then used for peer assessment.

Teacher educators assess knowledge as well as skills in GLAs. Seven of the teacher educators stated that in GLAs they also assess the collaboration process of the students. One of these teacher educators mentioned as a criterion the quality of the collaboration process, another teacher educator the time students invest in GLAs. Teacher educators differed in their ideas to provide the assessment criteria beforehand. One teacher educator believes that the assessment criteria can influence students’ involvement in GLAs and therefore decides on and reveals the criteria before students start working on a GLA, another teacher educator decides on the criteria afterwards.

Group grades are used, sometimes combined with individual grades. Four teacher educators see group grades as problematic as these give the possibility of free-riding. One teacher educator also mentioned that group grades are unfair for high performing students.

4.3.1.4 Task characteristics

Teacher educators mentioned a number of requirements for a collaborative task. The next example is about the meaningfulness of a task, reported by one teacher educator:

'Something we always take into account is that it should be meaningful for students. That it has to do with their future profession. That it is a situation they can also use in their school practice.' (1, A)

Several teacher educators stated that the task should be authentic and be closely related to the practice of teaching in schools. For example, they ask students to organize a sports event, develop and perform lessons for primary school classes, prepare a meeting with parents of pupils, or setup a simulation of team working in school. Furthermore, teacher educators mentioned other task characteristics:

- 1) a task should use of authentic materials;
- 2) a task should be challenging;
- 3) a task should stimulate students to discuss and exchange ideas and experiences, and
- 4) a task should be suitable for collaborative work.

One teacher educator asked her students to produce a stop-motion movie. Those students were asked to write a script and use daily objects to produce a stop-motion movie that could be used in primary education. Another teacher educator mentioned that she/he would like to become more proficient in designing tasks that are suitable for group work and that stimulate all group members to collaborate.

Two teacher educators provide students with some degree of freedom in how they perform a GLA task:

'The assignment is usually a broad one. And I want the students to choose from a variety of possibilities. If you design the group assignment very specific, then there is no freedom whatsoever for the students.' (8, B)

Five teacher educators indicated that they design smaller activities within one large GLA, of which some can be individual activities. One teacher educator reported that she/he alternates activities in a GLA, by having students collaborate in a large group and in small groups.

4.3.1.5 Structuring

Following to the GLAID framework, structuring refers to the decisions on how to stimulate students to work collaboratively with the aim of ensuring positive interdependence and individual accountability. Prior to the implementation of GLAs, teacher educators structure the collaboration by (1) appointing roles to students, (2) providing information on the desired level and way of collaboration, and (3) designing activities that require collaboration.

With respect to roles, teacher educators mentioned examples such as students collaborating as in a formal meeting in school, assigning roles like a chair and secretary, role-play in schools with roles as school leader, team leader, teacher, and a parent of a student.

With respect to providing information on collaboration, teacher educators structure student collaboration by instructing students how to collaborate by, for example, giving a lecture on this topic, by stressing the rules and conditions for good collaboration, or by training students in collaboration skills.

The third way teacher educators structure the collaboration is the kind of (sub-) activity they design. They talked, for instance, about 'Jigsaw' or the 'Place-mat' activity. Sometimes they also use assignments that are so difficult or complex that they could not be completed individually, in order to make use of the interdependence between students. One teacher educator ensures interdependence by distributing materials between the students, so that they need each other to gather all of the information. In this assignment, the materials -articles needed to complete the assignment- are split up and the separate parts are made available to particular students in the group. Interdependence between students is sometimes also established by announcing that group grades will be used.

In addition to design activities prior to the GLA, teacher educators can also structure student collaboration during the GLA. Examples teacher educators mentioned are 1) asking questions about the process of collaboration, 2) suggesting students that they can ask for help from others, 3) providing feedback on the (assigned) roles students adopt, and teacher educators taking a role as one of the participants in the collaboration process. Below is an example of a teacher educator's description of how she/he structures the collaboration during an activity:

'If Kees stands aside during the game, I say to the students "Guys, come on, maybe it is a nice thing to, for example, add a chameleon to the game. So if there are two battling parties, the chameleon is always part of the attacking party". Then I encourage Kees: "Could you try this?" From that moment on Kees has to play a more dominant role in the group, so he cannot withdraw from the game.' (23, F)

Teacher educators stated that students themselves can also structure the collaboration: for instance, by dividing tasks or roles, or by formulating a script for the task performance together. However, teacher educators mentioned that students distributing the task or workload might mean that students only learn from their own activities and that they do not exchange experiences and knowledge.

Finally, teacher educators not only structure prior to en during the GLA, but also afterwards. Students' reflection on or evaluation of the collaboration can be regarded as part of the structuring and it increases students' awareness of individual accountability and interdependence amongst students. For example, teacher educators schedule feedback moments to discuss with students the roles they had in the collaboration or students write a learning journal on how they individually contributed to the collaboration and the collective product.

A common concern regarding structuring of the collaboration is students' free-riding. Free riding students deliberately ignore their individual accountability for the GLA and do not seem to feel positively interdependent. Teacher educators feel they do not have the design skills to prevent this free-riding behavior.

4.3.1.6

Guidance

'I think the guiding teacher educator is crucial in the collaboration process. He is the one that can confront students with their behaviour, guide a group in the right direction, and discuss dilemmas. You cannot just tell students, "Here you are: your group assignment. Please complete it with four students and show us the results in three weeks".' (20, E)

Like the teacher educator who provided this quotation, other teacher educators described their guiding role as significant for the successful implementation of GLAs. Three types of teacher educator roles in guiding GLAs were described: 1) pedagogical role, 2) social role and 3) organisational role. The pedagogical role includes modeling how to ask reflective questions, stimulating an inquisitive attitude, asking probing questions, acting as an expert on the matter, providing help in generating content-related ideas, adjusting guidance to the needs of the groups (differentiating), and getting the most out of students. The social role includes showing students the additional value of collaborative work, being a role model for collaborative work, providing feedback on the collaboration process and evaluating it with students, coaching and supporting students, and motivating students for the collaborative work. The organizational role includes emphasizing the requirements and objectives of the assignment, offering help in the choice of group composition, monitoring the collaboration as a distant observant, and intervening when the interaction is not effective, when students are excluded from the collaboration or when students are free-riding. According to one of the teacher educators, students do not always think positively about the guidance:

'I have difficulties in having a group accept my process interventions. [...] I have to convince them that my role is necessary and that they should be open up to this. [...] They need to consider my interventions valuable and they need to trust that I know what is needed.' (16, D)

Four teacher educators stressed the importance of timing guidance: it should be just-in-time, depending on the needs of the students. One of these teacher educators stated that one needs intuition to determine the appropriate moment for interventions in the collaboration.

In the Dutch situation, it is common that two or more teacher educators teach the same GLA in different classes with their own students. This implies that teacher educators have to mutually harmonize their guidance.

4.3.1.7 Group constellation

Most teacher educators reported that they determine the group constellation themselves. Two of the teacher educators use large groups (with ten or more students), in which smaller groups work on sub-tasks of the GLA. One teacher educator stated that large groups are more suitable for collaborative work on projects and small groups for sharing ideas and experiences in a safe environment. Other teacher educators stressed disadvantages of large groups: in large groups, students feel less safe, reaching consensus is problematic and the student engagement is less compared to small groups.

Nine of the teacher educators also decide group composition. Three teacher educators base their group composition on student characteristics, such as students' cultural background, level of expertise or knowledge, gender, educational background, and expertise in collaboration. For example:

'I have specific demands regarding the group composition. The students compose the groups themselves, and groups contain students from different educational programs and with a different number of years of experience. I do not want students from the same educational programme working together, because they know each other too well.' (16, D)

One teacher educator determines group composition by testing students prior to the GLA on their ability or interests. This teacher educator composes homogeneous groups. The other teacher educators who compose groups use heterogeneous groups.

Fourteen teacher educators have students compose their groups themselves. Two of them try to prevent the students from choosing the same students to work with. They want to prevent this for two reasons: (1) students get to know each other too well, and (2) high-performing students tend to choose one another, and as consequence do not contribute to higher learning outcomes of low-performing students.

4.3.1.8 Facilities

The facilities component refers to the various resources students can use to work on a GLA. Teacher educators mentioned technology tools for communication and collaboration, such as email, or discussion boards. One teacher educator reported that students should be more aware of technology they can use to communicate:

‘I think they use too few of the available digital possibilities. [...] for example, how to use the discussion boards in the electronic learning environment.’ (20, E)

Another teacher educator stated that teachers need to model the use of the digital facilities. Another teacher educator stated a lack of proficiency in implementing such tools and expressed the desire to learn how digital tools can be implemented to support the collaboration process and the communication of students.

In addition to technology tools to support students’ communication and collaboration, other design decision regarding the facilities involves supportive lectures about course-related content, information about how to collaborate in case descriptions and articles, documents to evaluate collaboration process, and software students can use to work on assignments, such as Windows Moviemaker and the discussion board of a digital learning environment. Two teacher educators stressed the importance of (class-) rooms suitable for collaboration purposes:

‘What we see in classrooms most of the time is that we put the tables in a horseshoe arrangement. Sometimes we rearrange the tables into real group arrangements.’ (2, A)

Finally, three teacher educators emphasized that students should have sufficient time for GLAs. It is necessary to ensure that timetables are not overloaded, so that the students have time to work together on the assignment.

4.3.2 Alignment between the components

Alignment implies that (a) decisions made in the design of each of the eight components are related to the design of the other components and (b) all of the steps in the design are attuned with one another.

Twenty of the twenty-three teacher educators referred in one or more of their statements to the alignment of components of the GLAID framework: steps 2 and 3a/b (see table 1). It was examined whether teacher educators aligned the components within each step separately, and whether the alignment between the three steps was described.

The prevalence of alignment between pairs of components is summarised in Table 4.

Table 4 Prevalence of alignment between components.

	1	2	3	4	5	6	7	8
Interaction (1)	-	17	1	12	5	11	7	4
Learning objectives and outcomes (2)		-	2	11	6	10	1	3
Assessment (3)			-	3	2	3	0	0
Task characteristics (4)				-	7	3	2	3
Structuring (5)					-	8	0	2
Guidance (6)						-	3	0
Group constellation (7)							-	0
Facilities (8)								-

Very few teacher educators mentioned the alignment between assessment and the other two components of this step: interaction and learning objectives/outcomes. In step 3a, only three teacher educators described the alignment between guidance and the other two components of this step: task characteristics and structuring. In step 3b, no alignment was reported between the two components of this step: group constellation and facilities. However, the alignment between components of the three different steps was addressed more frequently.

Alignment between interaction and learning objectives/outcomes was frequently mentioned. One of the teachers gave an example that students learn mathematical procedures (learning objective) best when students explain it to each other. Conditional for this is that students are willing to listen carefully to one another and ask questions about the explanation (interaction).

Interaction was also mentioned in relation to task characteristics and guidance. Two teacher educators stressed that the kind of task determines the quality of the interaction; others also referred to structuring (four teacher educators), guidance (one teacher educator), and group constellation (four teacher educator) as determining factors of the quality of the interaction. Three teacher educators mentioned that they find it difficult to design tasks that lead to good collaboration and interaction.

The alignment of learning objectives with task characteristics or guidance was also mentioned. For example, one teacher educator underlined that teachers who guide a GLA need to focus on the learning objectives. In the GLA she/he implemented, this resulted in non-directive guidance, because one of the learning objectives was that students would regulate their learning processes themselves. A final example of alignment between two components stresses the usefulness of alignment between the components. An example is the alignment between assessment (group grades) and interaction:

'If I make sure that they [red. students] are interdependent regarding the final results, a certain self-regulatory ability in the group grows. Then they get angry if they do not stick to their agreements. I am not that concerned about the quarrels it causes.' (16, D)

Some of the teacher educators referred to the alignment of more than two components. Teacher educators referred to seventeen alignments between three components and five alignments between four components. The following example illustrates the alignment between facilities, interaction, and learning objectives/outcomes:

‘I regularly use newspaper and journal articles that are related to the topic, the content of the lecture, and then I ask their opinion: how they think they could use it in practice. And that elicits the exchange of ideas and thoughts. And often they gain new and different insights too.’ (14, D)

4.4 Discussion and conclusion

Group Learning Activities (GLAs) do not always yield the desired learning outcomes and the Group Learning Activities Instructional Design (GLAID) framework aims at supporting teachers in their design of GLAs. The aim of the current research was to empirically validate this framework with the self-reported design decisions of teacher educators. The research question of this study was: 'How do teacher educators design and implement GLAs, and to what extent do their considerations match with the GLAID framework?'. The components and the alignment described in the GLAID framework were used to analyse teacher educators' descriptions of their experiences with GLAs. Teacher educators addressed all eight components of the framework. However, the facilities component was only addressed by a minority of the teacher educators. The teacher educators did not report new components of GLAs. Teacher educators referred to the alignment between components, which is an integral aspect of the GLAID framework. Next some remarks will be made about the facilities component and the structuring component.

Two explanations might be considered for the low number of teacher educators who mentioned aspects of the facilities component. First, it is possible that the tasks teacher educators described for GLAs are mainly complex tasks students can work on in various ways. Therefore, it is possibly not predetermined what resources students will use or might need. Second, some teacher educators avoid using computers as a means of communication because of problems they foresee or encounter in their use (Dillenbourg, 2013). However, the facilities component is considered to be important to include in the design of GLAs, because no matter how well a GLA is designed, without the necessary space, time, and supporting tools and materials students will not be able to attain the learning objectives of a GLA (see Chiriac & Granström, 2012; Dillenbourg, 2002; Gros, 2001; Janssen, 2013; Kobbe, Weinberger, Dillenbourg, Harrer, Hämäläinen, Häkkinen, & Fischer, 2007; Strijbos, Martens, & Jochems, 2004).

Furthermore, the interviews revealed that many teacher educators struggle with the structuring component. They consider free-riding to be a major problem in GLAs. Several teacher educators indicated that they would like to learn more about how to engage students in the collaboration process. Structuring is perhaps the most difficult, but possibly also the most important aspect of GLAs. Structuring student interaction might increase individual accountability and positive interdependence, and as such can prevent students from free-riding (Dillenbourg, 2002; Johnson & Johnson, 2009; Slavin, 1999). According to Janssen (2014), student preparation for GLAs and the level of interdependence between group members (and also the availability of tools, support, and scaffolds) have a positive effect on the interaction, which in turn positively influences learning outcomes.

4.4.1 Limitations

In the GLAID framework, alignment is stressed as an important condition for successful GLAs. Although many indications were found that teacher educators align components, the teacher educators were not specifically asked about alignment between components. Hence, it is possible that, although the teacher educators did not express it, alignments are included in their considerations in the design of GLAs. Another explanation may be that the teacher educators implement existing GLA designs and, therefore, do not decide a priori on the design of the components and their alignment.

4.4.2 Practical implications

A structured approach for the design of GLAs may lead to better student learning outcomes. The teacher educators' design and implementation practices, as extracted from the interviews, contribute to an empirical validation of the GLAID framework that is precisely meant to support such a structured design. The interviews further highlighted teacher educators experience problems with respect to the design of the components interaction, structuring, and facilities. Next will be described how the use of the GLAID framework can support teacher educators to diminish the problems with these design components.

Interaction. Several teacher educators observe too little depth in the conversation of their students. In order to stimulate depth in student interaction, the interaction could be better aligned with other components of the GLA-design. For example, the task type could be designed specifically for student interaction by choosing a task in which students cannot divide the work, but need to interact. An example of such a task is a discussion wherein the resources, such as articles from different authors or different aspects/opinions of a topic, are distributed amongst the students (structuring), and wherein the assessment is focused on assessing the interaction (i.e. the discussion) amongst students. Another example is the alignment between interaction and group constellation. By deliberately composing groups instead of having students compose their own groups, the depth of the interaction could be positively influenced by increasing the variety of perspectives or knowledge levels (when students chose their own groups they are likely to chose group members they know and are more likely to agree with on a specific topic).

Structuring. Structuring of a GLA can help to prevent free-riding of students. Stimulating all students to contribute to the GLA can be accomplished by assigning roles to students, distributing resources that are needed to fulfill the assignment, or instructions on how to collaborate. For example, instructions can focus on prompting students to remind their peers that they are accountable for their contributions to the group work, or to provide feedback on each other's contribution to the discussion or the group product. Also, alignment with the guidance component may diminish the likelihood of free-riding, for example when the guidance is focused on the collaboration process (instead of on the product).

Facilities. Facilities may contribute to the effectiveness of the GLA-design. The use of technological facilities may support the collaboration of students by implementing the GLA-design as a blended learning environment. The use of chat, discussion boards or wiki's may enable students to collaborate from the place and at a time they prefer, without the restriction of physical presence in university. This technology can also enable the guiding teacher to monitor the collaboration and provide feedback in this digital environment; thereby the guidance can be more effectively aligned with the interaction.

4.4.3 Directions for further research

In practice oriented research an intervention could be used, consisting of a professional development activity for teachers during which they learn to design GLAs using the GLAID framework. The designs could be evaluated for their usefulness and be compared with former designs that were designed intuitively.

Future scientific research could focus on the effectiveness of particular design components on learning outcomes assessed with objective quantitative measures such as test scores. For example, using a quasi-experimental design, one or more components could be manipulated, to infer causal explanations.

4.4.4 Conclusion

The twenty-three interviewed teacher educators used the eight components proposed by the GLAID framework in their design and implementation of GLAs. This means that these components are not only grounded in the academic literature (see De Hei et al., 2016), but are used by practitioners as well. This implies that the GLAID framework can be useful as a practitioner guide in teacher education for educators who want to design, implement, and evaluate their GLAs.

