

Collaboration in teacher design teams: Untangling the relationship between experiences of the collaboration process and perceptions of the redesigned curriculum

Abstract

This qualitative case study involved exploration of the experiences of teacher educators ($n=6$) who collaborated on a curriculum design task. The study offers insights into collaboration processes of teacher design teams in relation to the outcomes of the collaborative work, in the specific context of a curriculum innovation. The role that the collaboration process played in teachers' perceptions of the designed curriculum is described using concepts regarding the nature of collaboration. Results from in-depth interviews and storylines indicated that positive collaboration experiences during the design process explained teachers' positive and/or more explicit perceptions of the designed curriculum. However, perceptions related to the curriculum rationale were an exception to this general pattern: They remained diverse and superficial. Recommendations for practice are given in the form of design guidelines.

Keywords: process evaluation; curriculum design process; teacher collaboration; teacher design team; qualitative research; case study research

Highlights:

- Collaboration process explains teachers' perceptions of the designed curriculum.
- Nature of teachers' collaboration is shaped by group and process characteristics.
- Group characteristics are feelings of cohesion and collaborative task orientation.
- Process characteristics involve collective activities and structured task approach.
- Positive experienced characteristics foster positive perceptions of the curriculum.

1. Introduction

This study focuses on the process of collaboration within teacher design teams in the context of Higher Education. Since the past decade, teacher teams are increasingly being used as a strategy in curriculum reform processes (Stoll, Bolam, McMahon, & Wallace, 2006). As a consequence, curriculum design has become a common part of a teacher (educator)'s task, and this design task is often performed collaboratively (e.g. Schleicher, 2012). Especially the last ten years, collaborative curriculum design in teacher teams, also known as teacher design teams (TDTs), has gained popularity in many countries (e.g. project #SoETDT, 2015, www.teacherdesignteam.be – Belgium; Laferrière et al., 2006 – Canada; Author, 2012 – Ghana; Mooney Simmie, 2007 – Ireland). These so-called teacher design teams can be described in terms of 'a group of

at least two teachers from the same or related subjects, working together on a regular basis, with the goal to (re)design and enact (a part of) their common curriculum' (Handelzalts, 2009, p.7). Curriculum is a broad concept – it may refer to a single lesson, a course, or an educational program. In this study, we apply the notion of curriculum redesign to study the reform of an entire educational program. Previous studies have frequently demonstrated that teacher collaboration plays an important role in school improvement and in the sustainability of educational reforms (cf. Avalos, 2011; Coburn, Russell, Kaufman, & Stein, 2012). More specifically, several positive effects of teachers' participation in teacher (design) teams have been reported for: 1) the professional development of the involved team members (Author, 2015a; Avalos, 2011); 2) the development of reform ownership (Penuel, Roschelle, & Shechtman, 2007); 3) the actual implementation of the designed materials (Handelzalts, 2009; Penuel et al., 2007); and 4) the quality of the designed curriculum (Mooney Simmie, 2007).

Despite the many studies on TDTs, research has primarily focused on the realization of the end result of TDT's work or the development of the curriculum products. Binkhorst, Handelzalts, Poortman, and Van Joolingen (2015) therefore advised gaining a more thorough understanding of the processes within TDTs, because of their significant effects on TDT outcomes. It is only recently that research has started to conduct evaluations into what is happening during the TDT design process itself (cf. Author, 2015b; Binkhorst, Poortman, & Van Joolingen, 2017), and in particular, to the process of collaboration within teacher (design) teams (Vangrieken, Dochy, Raes, & Kyndt, 2015). However, the limited number of evaluation studies that take into account the process of teacher collaboration, have been focusing on learning purposes of teachers working together (Avalos, 2011), or emphasize the structural characteristics of the collaboration process, such as the composition of the team (Vangrieken et al., 2015). The nature of collaboration (such as joint work, shared responsibility, collaborative relationships) has not received much attention yet (Binkhorst et al., 2015). Vangrieken et al. (2015, p.37), therefore, concluded: 'Literature on teacher collaboration mainly appeared to focus on effects of teacher collaboration, why teachers should collaborate, what is needed to collaborate, etc. Thus the step of gaining insight in the phenomenon of teacher collaboration was mostly neglected.' As such, more systematic and in-depth qualitative research is needed in order to understand the nature of the teacher collaboration process in itself within the context of teacher design teams. More importantly, because high-quality collaboration within a TDT enables teachers to participate in an in-depth professional dialogue regarding the design task, and as such may facilitate shared perceptions about the designed curriculum.

What exactly happens during this collaboration within teacher teams, and how this collaboration process enables to explain teacher educators' perceptions of the redesigned curriculum is not researched in-depth. Therefore, untangling this relationship between the collaboration process and teachers' perceptions is important, because perceptions of the designed curriculum determine how the curriculum will be implemented (cf. Author, 2013; Author, 2016a; Luttenberg et al., 2013). Following

Walker (1971), we therefore conceive the curriculum design process as a dialogue – that is, a continuing deliberation where teachers actively take part in formulating choices, seeking alternatives, using information, stating arguments, and making decisions. Much influence can be exerted through such a dialogue; eventually, the nature of this dialogue determines what specific perceptions the involved teachers will have about the designed curriculum. While discussing the design, teachers clarify their own point of view and validate it in light of the views of others. Information is constantly interpreted on the basis of one's own frame of reference (Ketelaar et al., 2012) resulting in perceptions of the curriculum design and the curriculum materials that are consistent, or not, with one's own opinions about education (Luttenberg, Van Veen, & Imants, 2013).

This study aims to expand existing insights about teacher collaboration (i.e., collaboration processes are important in relation to the outcomes of the collaboration). More specifically, we focus on what exactly characterizes the collaboration process in the specific context of a design task, and what elements of this collaboration process precisely contribute positively or negatively to the outcomes. In this regard, we expect that positive collaboration experiences during the design process will generate positive perceptions of the curriculum design and the curriculum products.

2. Conceptual framework

2.1 Teachers' perceptions during collaborative curriculum design

A curriculum can be defined as a plan for learning (Taba, 1962). Such a learning plan is built of elements, namely rationale, aims/objectives, content, learning activities, teacher role, materials/resources, grouping, location, time, and assessment. The rationale is referring to the underlying principles guiding the curriculum and serves as the reference point to guarantee coherence between all curriculum elements (Van den Akker, 2010). In the context of collaboratively designing a curriculum it is important to agree on the rationale as it guides decisions about the other curriculum elements. This is not as easy as it may sound, since the rationale touches upon teachers' perceptions, values, and beliefs about the new curriculum. However, in reality many design conversations focus on daily and practical issues instead of the deeper level of values and beliefs (Author, 2015c; Kelchtermans, 2006).

Collaboration within a TDT enables teachers to participate in a professional dialogue about a curriculum design task (Mooney Simmie, 2007) and experience agency – that is, having control over the design-related choices and the actual curriculum materials that are made. Within a TDT a teacher can influence the new curriculum by trying to relate the choices to his or her own goals, interests, and motivations (Ketelaar, Beijgaard, Boshuizen, & Den Brok, 2012). The deliberation process that takes place in the TDT is the essence of curriculum development (Walker, 1971). Particularly within a TDT, teachers discuss alternatives for the curriculum design, reflect on ideas, opinions and experiences, and exert influence on the choices that are made about the curriculum. In Tam's (2015) words, collaboration offers 'opportunities for teachers to challenge individual beliefs and practices through ongoing

communication with colleagues, hearing the multiple perspectives of others, sharing new experiences and acquiring new understandings' (p.38).

Teachers interpret the information about the new curriculum, and this can be linked to their own frame of reference (Ketelaar et al., 2012). Congruence between a teacher's frame of reference and the rationale underpinning the new curriculum stimulates support of the new curriculum, while incongruence leads to opposition and difficulties with the implementation (Author, 2013; Author, 2014a). Within a TDT, teachers constantly envisage what the new curriculum includes and what it means for their educational practice (Luttenberg et al., 2013). Consequently, perceptions of the new curriculum are formed, adjusted, changed, and – maybe again – reconsidered during the collaborative design process.

2.2 Teacher collaboration

In their review study on teacher collaboration, Vangrieken et al. (2015) perceived collaboration as the 'joint interaction in the group in all activities that are needed to perform a shared task' (p.23). This group of collaborating individuals can be seen as a team when they form 'a distinguishable collection of individuals, who identify themselves as a team and interact as a team to reach certain shared goals for which they share responsibility and hold themselves mutually accountable' (p.25). This definition of a team fits a TDT, because of its task orientation, shared goals, carrying out of activities together, and reflecting together.

Positive effects of teacher collaboration have been reported, including increase of moral support and mutual trust between teachers, promotion of reflection, and contribution to school improvement (Kelchtermans, 2006; Vangrieken et al., 2015). Collaboration within the context of curriculum reform allows teachers to identify themselves with the new curriculum (Moolenaar, 2012), and may lead to a decrease in resistance towards the innovation (Ketelaar et al., 2012). Furthermore, through collaboration teachers experience feelings of collegiality and connectedness (Penuel et al., 2007; Tam, 2015).

Collaboration, however, does not automatically yield the aforementioned beneficial outcomes. For instance, when the content of the conversations stays mainly superficial and does not touch upon teachers' values and beliefs, in order to avoid conflicts (Kelchtermans, 2006). In such a situation, collaboration contributes to maintaining the status quo rather than contributing to change or improvement. Vangrieken et al. (2015) mentioned teachers' experience of feelings of competitiveness, and being pushed towards conformity with the majority. On a team level, Kelchtermans (2006) referred to contrived collegiality (when teachers experience the collaboration as forced), or balkanization (when closed subgroups arise who separate themselves from the other teachers) as possible negative side effects of teacher collaboration.

Collaboration in teams such as TDTs can manifest itself in a variety of forms, depending on the structure and the nature of the collaboration process. The structure of collaboration refers to the actual characteristics of the team, such as team composition, diversity, proportion of teachers involved, and duration (Vangrieken et al., 2015).

Research into teacher collaboration within design teams shows that the collaboration process is important with regard to the design dialogue (Boschman et al., 2015; Mooney Simmie, 2007), the curriculum's internal and external consistency (Albashiry et al., 2015), and the development of ownership for the change (Author, 2016b; Mooney Simmie, 2007); but research also shows that the collaboration process in itself has not received much attention yet (Binkhorst et al., 2015; Vangrieken et al., 2015).

Therefore, this paper focuses on the nature of collaboration, which refers to the way the teachers work (or do not work) together on their (design) task. The nature of the collaboration becomes manifest in a variety of activities a TDT undertakes. More specifically, the nature of collaboration will be approached in two ways. Firstly, based on Little's (1990) levels of interdependency, teacher collaboration can be placed on a continuum from independency to interdependency, reflecting a shift towards (more) shared responsibility, collective conceptions (of autonomy, support, and leadership), and group affiliation based on professional work. Secondly, the nature of the collaboration process can be described in reference to characteristics of the individuals involved, the group, and the organization. Vangrieken et al. (2015) distinguished:

- personal characteristics (e.g. adequate commitment and effort of TDT members, adequate knowledge and expertise, beliefs about teaching and learning);
- group characteristics (e.g. clear roles, manner of communication, group atmosphere);
- structural characteristics (e.g. time, interaction frequency, mandate);
- process characteristics (or group dynamics, e.g. flexibility, levels of (inter)dependency, task approach);
- organizational characteristics (e.g. general culture and atmosphere);
- support characteristics (e.g. leadership, availability of training, feedback, help).

To sum up, the nature of the collaboration process can become visible in the level of interdependency during collaboration activities and in the characteristics of the collaboration process.

3. Research questions

With our study, we aim to present a more multifaceted portrait of the process of collaboration within teacher design teams using a qualitative research approach. The main research question that guided this study was: What role does the nature of collaboration within a TDT play in teachers' perceptions of the designed curriculum? This question was divided into three sub-questions, namely:

1. How do teachers' perceptions of the curriculum elements evolve during their collaboration in the TDT?
2. Which factors shape the nature of collaboration within the TDT in terms of collaboration characteristics?
3. How do TDT members experience the nature of collaboration within the TDT in terms of levels of interdependency?

4. Method

We conducted a qualitative case study of one Teacher Design Team of a Technical Teacher College in the Netherlands, which we call Waterfront College. The case study approach allowed us to get an in-depth understanding of the nature of the collaborative design process within a TDT and how it explains teachers' perceptions of the designed curriculum.

4.1 Study's context

4.1.1 Setting

The study was conducted in the context of a public higher education institution in The Netherlands: Waterfront College. The college offers a four-year program, in which students are prepared to become technical teachers in (pre-)vocational education. The program focuses on acquisition of subject matter (technical) and pedagogical knowledge and skills. The program is organized in three teaching-learning domains, namely 1) the pedagogical domain, 2) the work/experience/reflection/research domain (WERR), and 3) four technical domains (Building Technology & Construction Techniques, ICT, Electrical Engineering/Mechanical Engineering/ Automotive Technology, and General Technology). Students are offered a curriculum that addresses the pedagogical and WERR domains, plus one of the technical domains. A large number of students study part-time, but also full-time students enroll in the program. Most of the graduates from Waterfront's program become teachers in technical pre- and secondary vocational education, but some of them get jobs in industry and trade.

Waterfront's teachers are both teacher-educator and teacher in one of the domains. In Higher Education in The Netherlands, it is commonly the teacher's task to decide how the curriculum design should look like and to develop the curriculum materials.

4.1.2 Information about the curriculum innovation

The last decade, because of multiple technological and educational developments, Waterfront College has been faced with the challenge of designing a program that would enable 1) an increase in student enrollment, and 2) a variety of graduation portfolios. It was decided that a flexible curriculum could address these challenges, and therefore, the college initiated a curriculum innovation on the program level, for which a teacher design team was assigned the task to collaboratively redesign and implement the flexible curriculum for the whole college. The innovation changed teachers' educational practices in two ways: through the redesigned curriculum that had to be implemented in their own educational practice and through the process of collaboratively designing this curriculum, which was new for the teacher educators.

Starting in the academic year 2014-2015, a multidisciplinary TDT accomplished the design task by developing a blended curriculum. A blended curriculum is a curriculum that consists of a balanced mix of face-to-face and online education. The TDT consisted of six teacher educators, one from each teaching-learning domain in the

curriculum: the pedagogical domain, the Work/Experience/ Reflection/Research domain (WERR), and four technical domains. Teacher educators volunteered to be a TDT member. Some of the TDT members developed and also implemented the curriculum materials; other TDT members were only involved in developing the curriculum while other teacher educators were responsible for its implementation.

The TDT had a total of 14 meetings, which were spread throughout the academic year. 13 meetings took place in the college, except for the last one, which was organized in a location outside. Each meeting lasted between 2 and 3 hours, on average. Up to the tenth meeting there was a project leader, and he prepared and led the meetings. After his retirement, this role was taken over by the senior lecturer responsible for curriculum, together with the researcher (first author). All TDT members had previous experience with individually developing courses and lesson materials, but none of them had experience with designing a complete curriculum, nor with designing blended education, and neither with the process of collaborative design. Procedural support was provided to the TDT by structuring the meetings according to the ADDIE model (analysis – design – development – implementation – evaluation, Gustafson & Branch, 2002). Content support was provided by inviting experts to share their expertise in three optional workshops and two experienced colleagues provided just-in-time answers when questions or problems arose.

During the meetings, the TDT mainly worked on the curriculum at the institutional level, in other words, the curriculum as a framework (Table 1). The TDT discussed the curriculum design task (e.g. vision, design guidelines), the organization of the common parts (i.e., parts of the curriculum that apply to all graduation profiles), and shared experiences with the implementation of the newly developed courses. The TDT also discussed its own functioning and communication with the wider teacher team. The TDT organized four meetings explicitly for all teachers of Waterfront College, namely about the curriculum design and common parts of it, design guidelines and examples of how these can be realized, how to approach a design task, and about the communication of the TDT with the wider team. The actual development work regarding the curriculum at the course level was mainly carried out outside the TDT. Five TDT members sought, occasionally, the assistance of individual teacher educators from the wider team by asking for advice about the content of a specific course.

Table 1: Schedule and content of TDT meetings

meeting	themes
Sept	1 - design: program years 3-4 - process (tasks, appointments)
	2 - process (planning, themes, communication) - design: design guidelines, cross-curricular domains, graduation profiles
Oct	3 - exchange: reasons curriculum change - design: domains, - process (communication) - sharing information (field)
	4 workshop: AdobeConnect
	5 peer consultation: curriculum design task
	6 workshop: AdobeConnect
Nov	7 - process (communication) - design: Graduation requirements, design guidelines - development: technical domains
	8 - process (communication, task agreements) - advice: Graduation requirements, communication - design: assessment, Graduation requirements, domains
Jan	9 - design: design guidelines, graduation profiles - discuss technical courses - process (communication)
Feb	10 - process (preconditions, coordination, support) - design: bottlenecks, assessment plan
March	11 - process (task agreements, responsibilities) - design: electives year 3, year 4 - development: performance assessments
	12 - process (communication, preconditions, decisions) - design: specification design guidelines - sharing information: design guidelines - development: technical course - implementation: electronic learning environment, course descriptions
May	13 - analysis: cross-curricular domains - design: course structure, teacher/student centeredness, - sharing information: design guidelines
June	14 - process (communication) - analysis: flexibility (re)design domains

4.1.3 Role of the researcher

The researcher played a role in scheduling the TDT meetings and in answering questions the TDT members had (about the college's former curriculum and its students). The researcher was present during all TDT meetings, but was not a TDT member. From the tenth meeting, the role of the researcher changed towards (assisting in) preparing and leading the meetings (see description in 4.1.2).

In order to ensure the study's validity and reliability, we took into account Miles and Huberman's (1994) recommendations regarding the researcher effect. Firstly, the

position of the researcher and the intentions of the research were clearly mentioned every time data were collected. Communication between researcher and her colleagues could be characterized in terms of mutual trust, which led to an atmosphere in which participants dared to expose their reflections to the researcher. Moreover, the fact that the researcher was a direct colleague of the participating teacher educators made it possible to cover the whole design and implementation process from the beginning to the end. Following the curriculum redesign process real-time, intensively, and longitudinally yielded rich data. The researcher's familiarity with the phenomenon and setting under study also supported gaining authentic and trustworthy data and helped with interpreting the results within this context. Furthermore, by thinking conceptually, using member checks, and giving a transparent description of the research process, we aimed to improve the validity and reliability of this study. Finally, triangulation was applied and the findings were discussed with researchers who were not part of the study's context.

4.2. Data collection

All six teacher educators who made up the TDT participated in this study. Table 2 shows an overview of their characteristics and the domain they represent. The project leader is not considered a part of the TDT.

Table 2: Participants

teacher educator¹	background	age²	teaching experience²	design experience²	domain within Waterfront College
Inge	Master + teaching certificate	32	5	3	pedagogical
Bettine	Ph.D. + teaching certificate	33	7	1	Work, Experiential, Reflection and Research (WERR)
Harold	Master + teaching certificate	53	27	20	technical: ICT
Maarten	Bachelor + teaching certificate	54	5	5	technical: Electrical Engineering/ Mechanical Technology/ Automotive Technology
Anton	Master	54	20	8	technical: General Technology
Sjoerd	Bachelor + teaching certificate	47	4	2	technical: Building Technology/ Construction Techniques

¹ pseudonym ² in years

Perception-interviews

With each TDT member, interviews were conducted that focused on the TDT member's perceptions of the redesigned curriculum and its elements. This interview was conducted twice using the same interview protocol: halfway through the design process and at the end of the year-long process. The interviews, which we will call the

perception-interviews, focused on the following question for each month of the design process, namely:

- Based on the TDT activities in [month], what was your opinion of the curriculum? In order to accurately answer this question, the researcher presented an overview that reminded the participant of the TDT activities that have been taking place in each month.

Storylines and storylines-interview

At the final TDT meeting all TDT members ($n=6$) were asked to draw an individual storyline about the collaboration within the TDT. A storyline reflects a series of experiences or events that are valued by the participant (Beijaard, Van Driel, & Verloop, 1999). The TDT members were each given a format of a storyline with the 14 TDT meetings on the x-axis and five values (1=very negative; 5=very positive) on the y-axis. They also got a summary of the content of each TDT meeting. The assignment was:

- What is your evaluation of the (substantive) collaboration within the TDT at each meeting, from the perspective of developing the blended curriculum?

The storyline was followed by another interview, the so-called storyline-interview. This interview focused on collaboration within the TDT and was conducted after the year-long design process was over. Based on their own storyline, each TDT member answered the following questions about TDT meetings they valued as (very) positive or (very) negative:

- What makes you consider [month] as a high point, or a low point?
- How would you summarize the situations in which you evaluated the collaboration as at a high point or a low point?

Logbooks and meeting transcriptions

Reconstructing a process in hindsight carries the risk that participants re-tell the story in relation to their current appreciation of the process as a whole. In order to count for this validity issue, we used ‘real-time’ sources for validating the reconstructed data, namely logbooks and transcriptions of the TDT meetings. The TDT members kept a logbook during their participation in the TDT; each month, they described what they actually did for the curriculum and to what insights about the new curriculum this has led. Both the logbooks and the transcriptions of the TDT meetings revealed that the actual occurrences (i.e., what has been said or written during the actual process) aligned well with the reconstructed perception data.

4.3 Data analysis

Data were analyzed using qualitative content analysis. All interviews were audiotaped, relevant statements by the TDT members were summarized, illustrative descriptions were cited, and the fragments were coded. Validation was done by asking each TDT member to approve the summary and coding of their interviews, which they all did without any relevant supplements (i.e. member check). The fragments for each TDT

meeting were analyzed interpretively, for which the first author took the lead and the co-authors functioned as a critical friend. The coding took place by means of a coding frame, using predetermined, theory-based codes. These codes turned out to be adequate. *Collaboration* was operationalized as a situation characterized by a shared responsibility and in which TDT members are actually doing things together for curriculum design-related purposes (Kelchtermans, 2006; Vangrieken et al., 2015). Based on the storylines and the storyline-interviews, the collaboration process within the TDT was analyzed in terms of the nature of the collaboration (Little, 1990; Vangrieken et al., 2015; see Table 3 for sample codes and themes about the nature of the collaboration).

Table 3: Coding scheme for nature of collaboration (example)

participant descriptions		characteristics of the nature of the collaboration [*]			
meeting / statements		personal ^a	group ^b	process ^c	structural ^d organizational ^e support ^f
2 3**	I became enthusiastic: developing the WERR domain seemed fine and good, (...)	positive to task +			
5	Often the meetings lacked a strong chairman, we drifted all over the place because topics weren't delineated. Thus, not efficient and certainly not effective. Most of the meetings ended without proper decisions. Besides you have to keep in mind, it wasn't at all clear what topics we could make decisions about.		diffuse goals and tasks ☒	inefficiency & ineffectiveness through unstructured approach ☒	lack of time and planning ☒ mandate not settled ☒ lack of a strong leader ☒
10 11	Here suddenly an overview was presented, the two of you made a scheme. (...)			structured approach +	

^a attitude towards the task, knowledge and skills, self-efficacy, attitude towards collaboration, beliefs / ^b atmosphere, goals/task, cohesion, communication pattern, team composition / ^c group activities, task orientation and approach, progress and results, involvement of others, actual communication / ^d time, mandate, physical facilities / ^e individualistic or collaborative culture / ^f leadership, availability, backing

* + characteristic contributes positively to collaboration; ☒ characteristic contributes negatively to collaboration

** two meetings with one statement: the participant mentioned that his statement applied also to the second meeting

The six storylines were put together in one graph and formed a representation of the collaboration process as experienced by the TDT members (Figure 2). The analyses of the story-line interviews were used for a second analysis; this time, the statements that referred to group, process, and (internal TDT) support characteristics of the collaboration (i.e., the parts that show most directly the extent of collectivity) were coded using the four levels of interdependency (Little, 1990). We developed indicators for each level in order to determine the level of interdependency. Table 4 contains the sample codes and themes on which decisions about the level of interdependency were based.

Table 4: Independence – interdependency

Levels	Independency >>>	>>>>>>>>>>	>>>>>>>>>>	>>>> Dependency
Characteristics	1. Storytelling and scanning for ideas	2. Aid and assistance	3. Sharing ideas and materials	4. Joint work
Group ¹	<i>one way</i>	<i>individual action–</i>	<i>reciprocity:</i> show	<i>unity:</i> team
Process ²	<i>communication:</i> tell about own task; state unrequested	<i>reaction:</i> someone asks for opinions / ideas / suggestions;	and discuss materials / documents; discuss pro and cons of	proposals; team actions; collaborative design activities;
Support ³	opinions; tell about own problems	request to do / explore something; positive support	decisions; analyze practices; observe lessons; reflect on experiments; structured way of working	decision-taking about curriculum/tasks; solve problems; make / use own TDT protocols

¹ task orientation, cohesion; ² group activities, task approach, results, conflict management; ³ (internal TDT) help, leadership role

Perceptions are the descriptions the TDT members gave during the perception-interviews about their perception of the curriculum elements and their interrelationships. The coding of the perception-interviews used the ten curriculum elements as categories, each of them was coded as positive, neutral, or negative evaluations. Positive evaluations were characterized by positive words (e.g. like, well, good), negative evaluations included negative words (e.g. not, insufficient, ineffective), neutral evaluations included words that described observations or facts (e.g. it connects to, I recognized). Table 5 gives sample codes and example statements about perceptions.

Table 5: Perceptions of the curriculum – coding scheme

curriculum elements*	evaluation**	statements
rationale	☒	The curriculum is less flexible than thought and perhaps than intended.
aims and objectives	+/☒	I became aware of the complexity of the WERR domain, its coherence and the connections with other domains.
content	☒	Commotion commences about pedagogical courses X and Y.
teacher roles	+	I like the blend of face-to-face and online teaching.
materials and resources	☒	The website is well-designed, but it is not what we agreed upon.
grouping	+/☒	Face-to-face meetings still can be part of a blended curriculum.
learning environment	+/☒	The blended structure leads to discussions.

* the curriculum elements learning activities, time, and assessment were not present in the perceptions of the curriculum

** + perception positively coded; ☒ perception negatively coded

After coding the data, data analysis progressed in two phases. In the first phase – the vertical analysis (Miles & Huberman, 1994) – the individual teacher educator was taken as the unit of analysis. In the second phase of the analysis – the horizontal analysis – we looked for systematic differences, similarities, patterns, and processes across the six teacher educators regarding the interplay between the collaboration process and teachers’ perceptions. The technique of constant comparative analysis was used (Miles & Huberman, 1994). Only the results of the horizontal analysis are presented in this article, because the study focused on the TDT as a team and not on the individual members. Finally, each step of the data analysis was thoroughly documented and critically discussed within the research team.

5. Findings

5.1 How perceptions about the curriculum evolved over time (RQ1)

The answer to the first research question, *How do teachers’ perceptions of the curriculum elements evolve during their collaboration in the TDT*, was based on the perception-interviews. The six TDT members formulated 30 expressions in total that were coded as ‘perceptions’ regarding the curriculum elements. Overall, 43.3% of these perceptions could be characterized as positive, 43.3% as neutral, and 13.3% were negative. It appeared that the TDT members mainly expressed perceptions related to the curriculum rationale, content, and materials/resources. Few comments referred to the other elements (e.g. goals, teacher roles, grouping, and learning environment). Time, assessment, and learning activities were not mentioned at all. One TDT member (Anton) made no remarks about the curriculum products. He was mainly concerned with the collaboration process and although he finished his tasks, he distanced himself from the products; he did not want to share his perceptions about the results because the tenets of the new curriculum did not match his opinions about education from the start.

Firstly, the curriculum’s *rationale* is about what the curriculum is intended to realize, about the vision, and therefore, it touches upon one’s values and beliefs. In their descriptions, the TDT members expressed few specific terms related to the intentions of

the curriculum innovation or elaborations on underlying considerations. They formulated their perceptions of the rationale primarily in a descriptive and concise way. This could be because the decision to design a blended curriculum for organizing flexibility was taken before the TDT started its work, and not all TDT members were involved in that decision. The underlying reasons were only discussed once (meeting 3), but the decision could not be influenced anymore.

Most of the TDT members did not express any perception about the rationale until the 9th meeting. However, one TDT member (Bettine) stated as early as after meeting 3, that she felt that the rationale did not serve as an orientation for the curriculum design process, resulting in a curriculum design and materials that were not well thought through. Once expressed, perceptions changed little. The absence of perceptions about the rationale was not very surprising, due to the fact that the team did not collaborate yet in terms of sharing beliefs. Because the rationale relates to one's beliefs, the contradictory experiences in meetings 5–8 may indicate that the TDT was not a safe place, yet, to share these beliefs.

Only Inge referred to flexibility as being the original reason for the redesign of the curriculum when she said, “The curriculum is less flexible than thought and perhaps than intended”. She said this in meeting 13 – and her perception of the rationale turned negative. At the end of the design year, no consensus was reached in the TDT about the rationale for the curriculum. Perceptions were still diverse and stayed rather superficial; for instance, Sjoerd talked about the choice for a blended form, Inge about the reasons for the redesign, and Harold signalled more consistency between the curriculum elements and the rationale.

Secondly, the curriculum element *content* refers to what has to be learned. In general, content can be considered as a ‘safe’ element of the curriculum, in particular when it is about one's own courses and does not affect others. Perceptions of the content were neutral in the beginning, “I became aware of the complexity of the WERR domain, its coherence, and the connections with other domains” (Bettine, meeting 3). Halfway through the design year, differences became visible: They were expressed negatively, neutrally, as well as positively. Perceptions of the content gradually evolved towards neutral and positive ones, from meeting 9. TDT members started to use more specific and concrete formulations; also, they developed perceptions of the entire design, “At first I was skeptical about connecting the pedagogical and technical domains. But now, I can see possibilities of realizing this connection in a meaningful way” (Sjoerd, meeting 9). Furthermore, TDT members referred not only to their own courses anymore but expressed opinions about courses of other domains, “I hear that commotion is commencing about pedagogical courses X and Y. The design is different, and students have to do a lot, perhaps too much” (Harold, meeting 8).

Finally, the curriculum element *materials/resources* refers to the course materials and electronic learning environment that are used to learn. This can be considered as another ‘safe’ element of the curriculum because the TDT members connected it to one's own courses or domains. Remarkably, feelings of not being skilfull enough in the use of AdobeConnect that existed among some of the TDT

members, were barely mentioned. The pros and cons of a blended curriculum were discussed once (meeting 3), but the choice for AdobeConnect (which was made before the TDT started its work) was never doubted. Surprisingly, the positive experienced collaboration in meeting 4 did not have any effect on the perceptions, while a positive change in perceptions about the curriculum element ‘materials/resources’ could have been expected.

The perceptions were mostly about something a TDT member noticed (“Some colleagues made beautiful curriculum products”, Bettine, meeting 9). Once expressed, a TDT member rarely changed his perception. Even when things happened that were questionable, firmly stated opinions were rare – the formulations stayed general and did not provoke further discussions. Harold, for instance, signalled the commotion about pedagogical courses X and Y, and brought this to the meeting, but his remarks had no further implications. After meeting 9 and 12 perceptions of the materials/resources turned positive for the TDT members that had no, or negative, perceptions about this curriculum element.

In short, the TDT members mainly expressed perceptions of the curriculum rationale, content, and materials/ resources. Perceptions of the content and materials/resources evolved towards being (more) positive. Perceptions of the rationale, however, were still diverse at the end of the design year and stayed rather superficial.

In the next section, we will examine in what way teachers’ perceptions of the redesigned curriculum can be explained by the way the collaboration is experienced in terms of collaboration characteristics (paragraph 5.2) and in terms of levels of interdependency (paragraph 5.3).

5.2 Factors affecting the nature of collaboration (RQ2)

The second research question was: *Which factors influence the nature of collaboration within the TDT in terms of collaboration characteristics.* The storylines and the storyline-interviews were used for answering this question. All TDT members ($n=6$) produced a storyline about how they experienced the collaboration in the 14 TDT meetings. These experiences are presented in Figure 1.

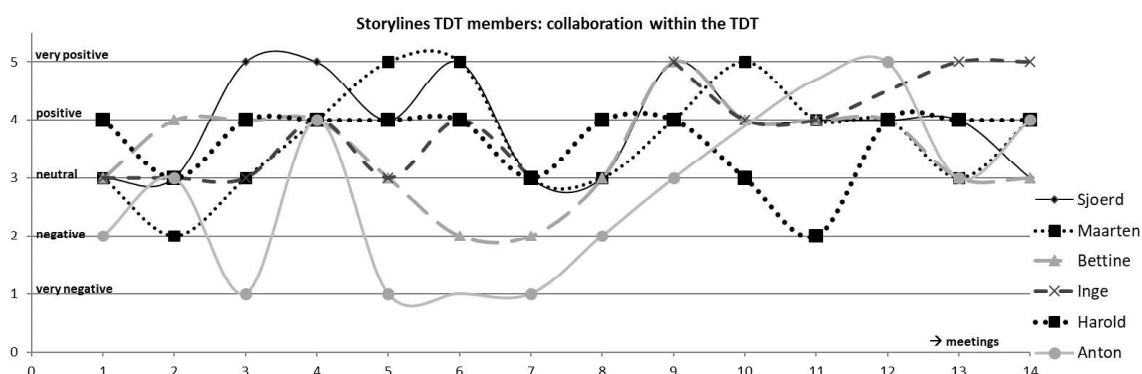


Figure 1: Experience of the collaboration

As can be seen in Figure 1, experiences of the collaboration showed differences between individuals and between meetings. Whether the collaboration was positively, or negatively experienced, was mainly due to the following factors: personal (6/6, mentioned by all 6 members), group (6/6), process (6/6), and structural (5/6) characteristics. Both organizational (1/6) and support (2/6) characteristics were barely mentioned by TDT members (Figure 2).

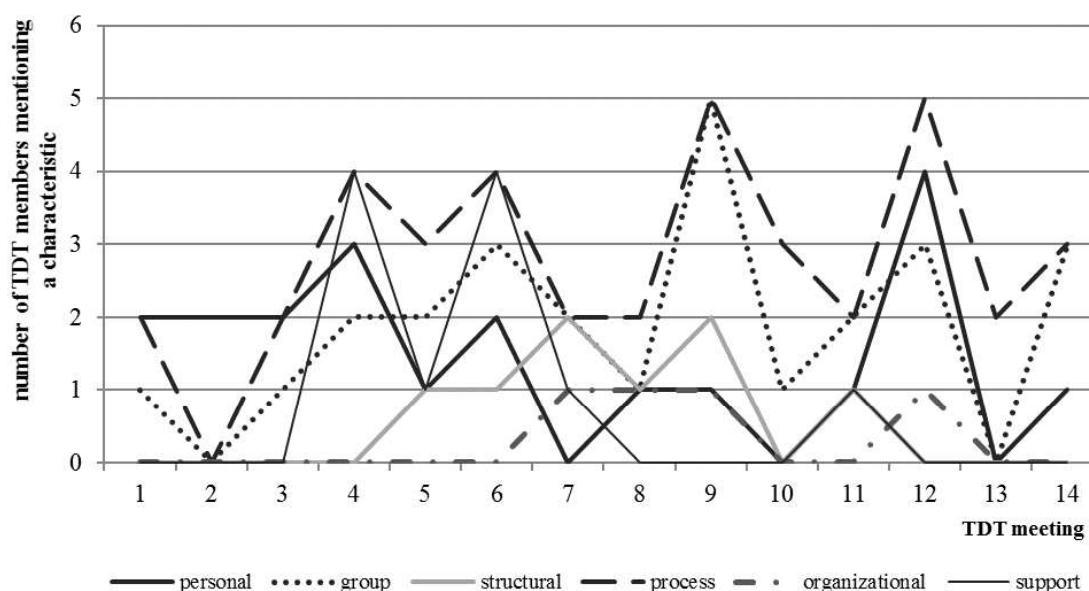


Figure 2 Collaboration characteristics

Personal characteristics refer to characteristics of the collaboration that represent individual preferences. We elaborate on the characteristics that were mentioned by a majority of the TDT members as mostly affecting the nature of the collaboration. Collaboration within a TDT was positively experienced when it matched with members' personal preferences (e.g. the need for structure was met, or the task at hand was energizing). Bettine, for instance, stated, "I became enthusiastic: Developing the WERR domain seemed fine and good, (...) this domain suffers from a lot of practical problems that affect students and colleagues negatively". TDT members further emphasized the importance of developing their knowledge and skills during TDT meetings, "From the discussions I learned a lot about giving grades based on assessment matrices" (Sjoerd). Collaboration was negatively experienced when a member interpreted his task rigidly or when a task did not align with personal opinions. Anton, for instance, described how his personal opinions about his domain clashed with the tenets of the new curriculum. He did not succeed in matching the curriculum's rationale to his own beliefs.

Group characteristics refer to stable characteristics of the TDT, or 'features that are specific to the particular team' (Vangrieken et al., 2015, p.33). A supportive and inspiring group atmosphere contributed positively to the experience of the collaboration process. Meeting 9 could be regarded as an example, "This was a very productive and very inspiring meeting. I shared a course of mine, which we discussed. (...) It broadened

my mind” (Sjoerd). Goals, tasks and agreements that were clear, unambiguous, on which there was consensus and that did not change during the process were seen as positively contributing to the collaboration process. On the other hand, when TDT members faced unclear or changing goals, unclear, dysfunctional or ad hoc tasks, inappropriate tasks for a TDT, or indecisiveness, this had a negative impact on the collaboration. Anton, for instance, described this as follows, “We drifted all over the place because topics weren’t delineated. Most of the meetings ended without taking particular decisions”. Also feelings of group cohesion, such as collegiality, solidarity, and mutual trust, were important for the collaboration process:

The feeling of collaboratively making things better is what counts. This gives me energy to go further. It’s all about collaboratively exchanging what everyone has done so far, collaboratively exploring the horizon. (Maarten)

As such, individualism within the TDT was negatively determining TDT members’ experiences of the collaboration process. Overall, one of the TDT members counted for almost all negatively experienced group characteristics. This member did not succeed in aligning individual affective needs (about, among others, cohesion, group atmosphere and ways of supporting each other) to what the TDT offered in this regard. The member completed the task, but decided, during the participation in the TDT, to quit and started looking for a new job.

The dynamics in the group, or ‘characteristics that are related to the process of working together’ (Vangrieken et al., 2015, p.33), represent *process characteristics*. The TDT’s activities, approach, results, and conflict management (as part of the communication) seemed to affect the level of collaboration. TDT activities contributed positively to the collaboration process when they were about seeing examples from others, discussing specific curriculum products, giving mutual feedback and support, exchanging opinions, and when the activities resulted in visible outcomes. Anton, for instance, described these activities:

This meeting [12] we shared and developed learning materials, and feedback and feedforward was given. Materials were shared (...), things were exchanged, there were enough opportunities to give each other feedback. I trusted the advice was taken seriously and that it would lead to even better materials.

Furthermore, a well-structured, focused, interdependent, effective and efficient task approach contributed to the collaboration. Bettine, for instance, referred to a task overview which she appreciated. On the other hand, meetings were valued negatively when they were characterized as being unstructured, ad hoc, inappropriate, ineffective, inefficient, and were limited to short-term actions. Anton, when talking about the design of the domains, explained: “I was astonished about the approach. (...) very fundamental topics [about the institute’s policy] still had to be discussed while materials already had to be completed”.

Finally, *structural characteristics* refer to the preconditions of a collaboration process. Actually, these characteristics reflect the setting in which the nature of the collaboration becomes manifest. One TDT member mentioned the importance of having enough time for discussing a topic. The other three TDT members referred negatively to time, namely as time pressure. Harold articulated the negative feelings about the preconditions, “During the whole process, we were constantly pushing and pulling about hours and tasks and staffing. (...) Management remained unclear about tasks and hours and time and priorities and mandates”.

When mapping Figure 1 (storylines) onto Figure 2 (collaboration characteristics), it becomes clear that the way the collaboration was experienced can be linked to the characteristics of each meeting.

The TDT members experienced meetings 1 and 2 quite neutral – evaluations at both ends of the scale (very positive or very negative) were absent. Meeting 3 showed one TDT member with negative experiences, probably because this member had a different opinion that was not followed. However, the members barely referred to specific characteristics of the collaboration. Not surprisingly, because the group had just started. The group was still a collection of separate individuals; real collaboration was not at stake, yet, therefore it is logical that the perceptions of the characteristics of collaboration were (almost) absent.

Meeting 4 was (very) positively experienced by all TDT members. Members asked for aid and assistance in working with AdobeConnect and received, respectively offered, this help in workshops. The positive experiences could be linked to gaining knowledge (*personal*); clear goals resulting in a uniform task orientation, a supportive atmosphere (*group*); the well-structured approach, practical activities, mutual feedback (*process*); and getting/giving help (*support*).

Great differences showed up in the experiences of meetings 5 – 8. Depending on their evaluation, TDT members assigned positive, negative, or no influence to all types of characteristics. Two members were positive because of their own attitude towards collaboration (*personal*), the supportive atmosphere (*group*), and/or the task approach and collaborative activities (*process*). On the contrary, two members were negative about all but the personal characteristics. They referred to individuality/absence of cohesion, diffuse/unclear goals and task orientation, a not-supportive atmosphere (*group*); time pressure, indecisiveness due to unsettled mandates (*structural*); tensions due to insufficient conflict management, an unstructured task approach (*process*); an individualistic culture (*organizational*); and a general lack of support (*support*). For one of them, it seemed the unacceptable tenets of the curriculum prevented him to really join the group; for the other member, this seemed merely related to affective considerations. Remarkably, two other members did not mention anything at all about the collaboration in these meetings. These two appeared to be cautious in expressing their perceptions in general.

Starting from meeting 9, mostly positive experiences appeared. Especially meetings 9 and 12 were positively evaluated by a majority of the TDT members (both

about design guidelines, discussing and developing particular courses). These meetings were characterized by a supportive atmosphere and feelings of group cohesion (*group*); members appreciated the team’s collaborative concrete activities, which were conducted using a clear and structured task approach and resulted in visible outcomes (*process*).

In short, group and process characteristics mainly determined whether the collaboration was positively, or negatively experienced. By and large, the collaboration process was evaluated neutrally at the beginning, went through large differences, and then developed towards mostly positive evaluations. The evolvement of the collaboration process can be explained by the perceived characteristics of each meeting.

5.3 The nature of the collaboration within the TDT (RQ3)

The answer to the question *How do TDT members experience the nature of collaboration within the TDT in terms of levels of interdependency* was also based on the storylines and the storyline-interviews. The data revealed that the nature of the collaboration during the TDT’s design process could be typified in terms of group, process, and support characteristics (Vangrieken et al., 2015). Based on teachers’ experiences with these characteristics we were able to connect them to Little’s (1990) levels of interdependency (Figure 3). Each bullet represents a TDT member; positively valued collaboration indicators are grey, negative ones are black.

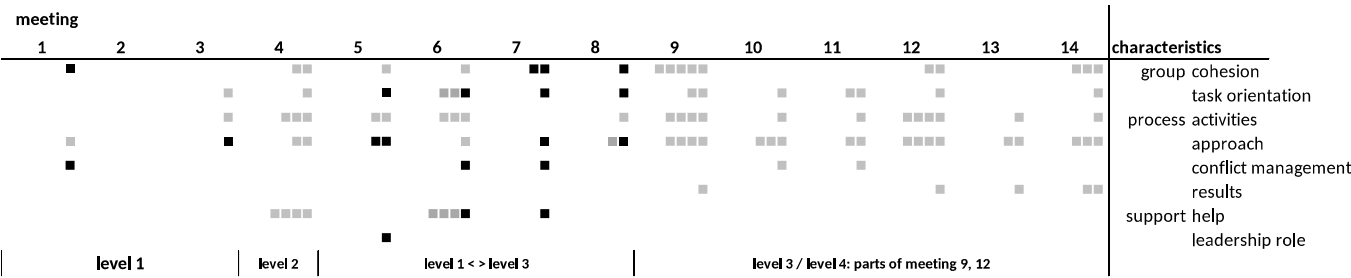


Figure 3: TDT meetings combined with levels of interdependency (Little, 1990)

During the first TDT meetings, the approach to the task and the individual statements that were put forward indicated collaboration at *level 1, storytelling and scanning for ideas*. The TDT members talked about a myriad of topics, e.g. general design guidelines, the aim of the new curriculum, the pros and cons of a blended curriculum, how web-based lessons could be designed, and about common parts of the curriculum as a whole (such as graduation profiles, assessments). At this moment, the approach to the task was still open; the kind of activities that the TDT were about to undertake were not defined yet, and also the way of collaborating was rather open: “I like thinking of all possible opportunities, making all kinds of plans about how our education can be” (Harold). During meeting 3, teachers expressed very different opinions about how to approach the TDT’s task. For instance, the design of a specific technical domain led to the temporary withdrawal of one TDT member. This member persisted in his opinion that it would be best to outsource the production of curriculum materials for one of the

technical domains; however, the other members, nor the management board, did approve: “When no one listens to my arguments, no one is really listening to me (...), than it becomes difficult to see anything positive in my tasks” (Anton). Still, this member’s disapproval stayed an individual action, no cohesion was shown. For these reasons, the nature of the collaboration was positioned at level 1.

During meeting 4, especially the experienced support (i.e., get/give help) connected the TDT’s collaboration to Little’s *level 2, aid and assistance*. TDT members had many questions about how to handle synchronous communication with the tool AdobeConnect, experienced uncertainties and difficulties using this program that should enable the communication in the online parts of the blended curriculum. Other TDT members, who were on the forefront in their use of this program offered help, tips, and tricks. Members expressed their feelings of cohesion; they valued the practical activities and structured approach; also, getting as well as giving help was mostly appreciated. Bettine, for instance, said: “I very much liked the workshop about AdobeConnect because you literally get something that you can use. I thought: When I have to offer those web-lessons than this is really very helpful”.

Meetings 5 to 8, showed a very diffuse picture: The nature of the collaboration between the teacher educators *shifted between levels 1, storytelling and scanning for ideas, and 3, sharing ideas and materials*. Taking a closer look, it appeared that the (very) negative evaluations regarding the nature of the collaboration mainly stemmed from the same two TDT members. They were negative because of a lack of perceived cohesion, an inappropriate or unstructured task approach, and feelings of being thrown back at oneself. This indicated the existence of tensions between individual interests and what was beneficial for the design process. They experienced not being a team; in other words, they were back on level 1. At the same time, the other TDT members experienced the opposite. It can be concluded that collaboration for them presented itself at level 3, namely with regard to feelings of group cohesion, a proper task approach, or because they received/offered help (with AdobeConnect). Maarten, for instance, mentioned that they, “supported each other with tips and ideas”. Especially meeting 7 was striking; both of the aforementioned TDT members referred to the group, process, and support characteristics of the collaboration (cohesion, task orientation, approach, conflict management, and help) in rather negative terms, but not one of the other TDT members mentioned anything about this meeting.

Starting from meeting 9, activities in the meetings became more focused at sharing specific materials as well as personal information, indicating collaboration entered *level 3, sharing ideas and materials*. Members experienced group cohesion and the group became more collaboratively oriented towards a shared task. For example:

Despite me being a subject teacher and the fact that this meeting was mainly about assessments in the WERR domain, (...). I do have an opinion on the WERR domain and I want to share this. (...) I think it’s good for all of us to see the complete picture. (Harold)

Process characteristics indicated more collaboration in all aspects (activities, approach, results, and conflict management). The TDT members showed how they interpreted the design guidelines by referring to their own courses. Personal experiences with curriculum implementation were shared, for instance about how they approached teacher/student centeredness in their courses. The TDT members started to give each other feedback, and exchanged ideas and alternatives. This led to progression in the curriculum design: The design guidelines were further refined, the curriculum was analyzed and evaluated, and courses were (re)designed. In this way, the results of the TDT's work became visible. Opinions about the collaboration were not always positive; however, conflicts were handled by perceiving them as an advantage instead of a problem. This was reflected by Sjoerd when he said: "Heterogeneity is preferable – early adaptors, followers, critical thinkers; to my opinion, this was a representative composition and that leads to good quality of the designed materials".

For meetings 9 and 12, the collaboration showed group and process characteristics that represented *level 4, joint work*. Feelings of group cohesion, the activities that were undertaken collaboratively, and the structured approach characterized these two meetings. Indeed, Inge described the TDT's development from level 1 to level 4 when she said:

In the beginning I was working merely individually, everyone did. But here [12] we started to look at our courses, what do they look like. And we learnt from each other. Collaboratively working on something practical and discussing this, leads to more profits. Profits with concern to concrete products and with concern to collaborative perceptions. (...) At a certain moment, I got the feeling: this is my team. With these people I collaborate the most. It's not necessary that you think the same about everything, as long as you work together.

The connection of the collaboration at *level 4, joint work*, in meetings 9 and 12 with the positively experienced group and process characteristics appeared to be an interesting one. It was exactly in these two meetings that perceptions of the curriculum elements underwent a change. More specifically, from meeting 9, perceptions about the rationale were expressed, and even changing thoughts about the rationale could be handled. Obviously, the feelings of group cohesion (*group*) and the way of communication (*process*) provided a collaborative environment that felt safe enough to discuss one's beliefs. Also, (more) positive perceptions of the content and materials/resources showed up when the TDT members collaborated at level 4, joint work.

To sum up, the nature of the collaboration started at *level 1, storytelling and scanning for ideas*, and evolved towards *level 3, sharing ideas and materials* with some outliers during the journey (that is, for two TDT members a fall back in the beginning, and perform optimally during some meetings). This development became visible in terms of more positively perceived group, process, and support characteristics. Especially positive group and process characteristics could be connected to

collaboration at *level 4, joint work*, which, in turn went along with the evolvement of (more) positive perceptions of the curriculum.

6. Discussion

The way in which teachers experience a curriculum innovation and the degree to which they implement change are determined by individual and social processes of sense-making. Teachers' interpretation and implementation of a curriculum innovation strongly depends on the congruence between their perceptions of the curriculum on the one hand and the rationale underpinning the curriculum on the other (Author, 2013; Ketelaar et al., 2012). Discrepancies between both affect teachers' actual responses to an innovation (Author, 2014a). Our study confirms the analytic and conceptual value of the sense-making literature, focusing on the role of actors in the realization of an educational innovation. In particular, this study confirmed the importance of collaborative curriculum design in order to develop feelings of ownership (cf. Author, 2011; Penuel et al., 2007) and shared perceptions (cf. Ketelaar et al., 2012; Bowles & Hattie, 2013) about the curriculum reform.

This study took a close look at the collaboration process of six teacher educators who formed a TDT to redesign their curriculum. The TDT members' perceptions of the curriculum rationale, content, and materials/resources developed over time towards being (more) positive and/or more elaborate (RQ1). Group and process characteristics affected the nature of the collaboration (RQ2). In particular, teachers' collaboration on the design task benefitted from feelings of cohesion and collegiality, a collaborative task orientation, and from collectively conducted concrete activities, a structured task approach, visible results, and a constructive conflict management. The nature of their collaboration (RQ3) showed itself in the beginning as merely individual working (Little, 1990: level 1, storytelling and scanning for ideas) and developed towards more collaborative working (level 3, sharing ideas and materials); in two of the TDT's meetings, even joint work (level 4) was recognized. Processes within the TDT played an important role in relation to the TDT's outcomes (cf. Binkhorst et al., 2017): In meetings in which the collaboration took place as joint work (level 4), i.e. in meetings that were experienced positively regarding its group and process characteristics, teachers' perceptions were adjusted. This corroborates the concept of 'constructive conflict' that Raes, Boon, Kyndt, and Dochy (2017) used; although their study involved student learning, they concluded that actively sharing information, using the diversity in opinions, and collaborating stimulated the team's progress with regard to their task.

At first sight, several parallels existed between the collaboration process and teachers' adjustments of their perceptions of the curriculum. From a more detailed point of view, however, perceptions of the rationale stayed rather superficial and diverse, whereas the other curriculum elements (content, materials/ resources) evolved towards more positive and/or more explicit ones. This is perhaps not surprising, because, according to Kelchtermans (2006), 'Collaboration that includes talk and discussion

about values and deeply held beliefs, does not only need a safe environment of trust and mutual respect, but also increases the risk that conflict and differences in opinion may appear' (p.233). It could be that it was not until the end of the design year that the collaboration was safe enough to express differences in opinion. If this is the case, the different opinions of the rationale at the end of the design year could be an indication of effective collaboration with an emphasis on sharing and interdependency (joint work) (Kelchtermans, 2006; Vangrieken et al., 2015). The TDT members expressed perceptions of the rationale, but from the agenda of the TDT meetings (see Table 1) it becomes obvious that the rationale was not explicitly discussed within the TDT. The lack of consensus could be an indication that the rationale did not serve as the major reference point of the curriculum design; it was not until the end of the year-long process that TDT members expressed that they gained overview, therefore it is not clear whether the other elements were coherently linked to the rationale and to each other. The study followed the TDT over one year, therefore it could not be determined whether teachers' perceptions of the rationale continued to evolve.

This study arrived at insights that contribute to research about the characteristics that affect the collaboration process in teacher teams in the context of curriculum innovations.

Within TDTs, collaboration is considered to be an essential aspect of curriculum design; based on this study, we agree with Binkhorst et al. (2017) when they concluded that characteristics of the process have a strong influence on the effectiveness of a TDT. In order to improve the collaboration characteristics, it seems promising to operate according to the principles of shared leadership, as Binkhorst et al. (2017) recommend. In particular, Binkhorst et al. (2017) stress, in the light of positive TDT outcomes, the crucial role of adapting the TDT's goals and activities to the individual member's needs. This crucial role is confirmed by the two TDT members in our study who experienced the collaboration process negatively and who retreated themselves from the TDT.

Regarding the nature of collaboration, we used Little's (1990) levels of interdependency. The levels that were recognized, resemble Tuckman and Jensen's (1977) phases of group development. The first two meetings contained indicators of forming, the orientating first phase of Tuckman's model. Then conflicts arose, which indicated a storming phase. Thereafter, more cohesion between the members developed – it seemed as if the TDT entered the norming phase. Towards the end of the design year, the TDT showed elements of the constructive performing phase when they evaluated the collaboration process in terms of working together according to functional roles on the design task.

Finally, as Author (2015a), the concept of transformative action indicates 'That the design task (and the related designed curriculum) is not only an individual asset, but becomes shared' (p.277). The evolution of the TDT towards level 3 (sharing ideas and materials) and sometimes level 4 (joint work) can be seen as a form of 'shared transformative agency'.

However, from our study, we can learn that it takes time to evolve towards becoming a joint team – for a substantial time the collaboration among the teachers was experienced as having less emphasis on sharing and interdependency. Research shows that this is not uncommon; discussions in TDTs are often superficial (Boschman et al., 2015; Kelchtermans, 2006; Vangrieken et al., 2015) and content is not discussed critically (Borko, 2004); discussions relate mostly to practical and organizational matters (Handelzalts, 2009); and Author (2014b) mentioned the lack of a shared vision, a vague vision or no vision at all. In his review study, Kelchtermans (2006) also found that real collaboration did not occur very often.

It is important to keep in mind that the TDT's task in this study was not a typical one for a TDT, in two ways. In the first place, a TDT generally designs for its own personal educational practice, whereas the TDT in this study designed for the whole college. In that case, the other teachers' practices will also be affected and, therefore, gaining support for the designed curriculum becomes crucial for a successful implementation. Furthermore, TDTs generally develop materials on a classroom level, whereas our TDT designed a curriculum on the institutional level (which implies a different focus). It was beyond the scope of this article to dive into these issues, but we addressed them in two other studies (Author, 2016a; Author, 2018).

Recommendations

Based on our study, we suggest a number of design guidelines for collaborative curriculum (re)design.

1. Process characteristics were related to the *level of interdependency* (Little, 1990) on which the collaboration took place. It is important that team members are aware of the different levels of interdependency. Such an awareness fosters the development of a culture that stimulates collaboration, i.e. stimulates transformative action (Author, 2015a). Furthermore, it is important that a TDT receives sufficient time in order to evolve towards the higher levels of interdependency.
2. Make sure to pay explicit attention to the *process of collaboration* in order to stimulate the evolvement of the team towards the higher levels of interdependency.
3. Make sure *group characteristics* are appropriate. Clearly stated goals and tasks, a supportive atmosphere and feelings of cohesion stimulated the collaboration process, and in turn, contributed to the adjustment towards more positive perceptions of the curriculum.
4. Pay attention to *process characteristics*. Plan for a structured approach of the design task, of which time to discuss the rationale is part so that it can function as a reference point to guarantee coherence between the curriculum elements (Van den Akker, 2010). Then, focus on concrete activities (i.e., the collaborative development of curriculum materials), and limit activities at an organizational level. These aspects were valued highly, and as such, contributed to the development of positive perceptions of the curriculum.

In further studies it would be interesting to explore what types of interventions can stimulate faster progress towards more interdependent collaboration. For instance, if the approach is conducted according to a structured design approach, will this result in reaching the higher levels of interdependency faster; or, if attention is paid to the atmosphere, will discussions about the rationale occur earlier?

Limitations

This study followed one TDT consisting of six teacher educators. Of course, the study must be replicated with more TDTs in order to contribute to the empirical generalizability of the findings. From a methodological view, the conceptualization of collaboration could be elaborated. Within the research, other concepts about teachers working together are used regularly, of which collegiality seems especially interesting in connection to collaboration. Collegiality can be seen as the affective dimension of collaboration: The term is used in reference to the quality of the relationships involved (Kelchtermans, 2006), which can be related to the group characteristics of the collaboration in our study. The concept of collegiality could be taken into account in further studies on collaboration and therefore add nuances and/or extensions beyond the current study. Furthermore, all data are retrospective reports about what the perceptions and experiences were. This could have resulted in a form of recall bias. We therefore validated the findings using ‘real-time’ data that were present as transcriptions and log books. However, gathering ‘real-time’ data, which preferably are not self-reported, would be a methodologically sound next step in the further development of our findings.

Most of the teachers in the team developed more positive perceptions. However, this does not mean the materials are implemented as intended, nor that they turn out positive in practice. Further studies could focus on the implementation of the curriculum materials.

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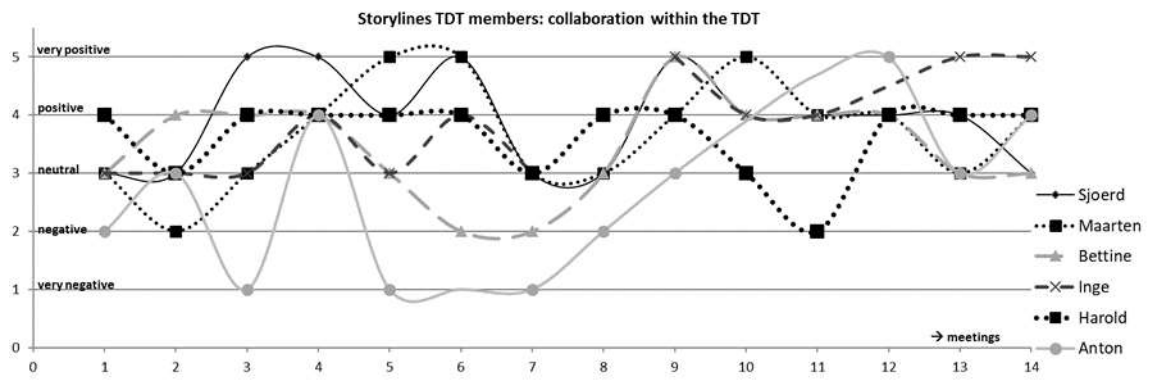


Figure 1: Experience of the collaboration

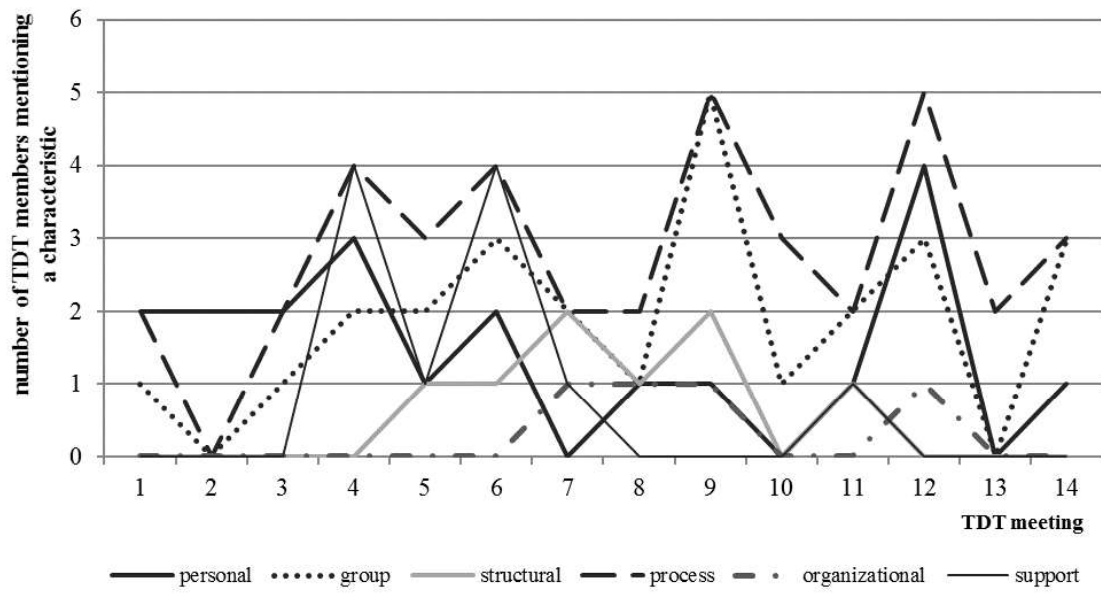


Figure 2 Collaboration characteristics

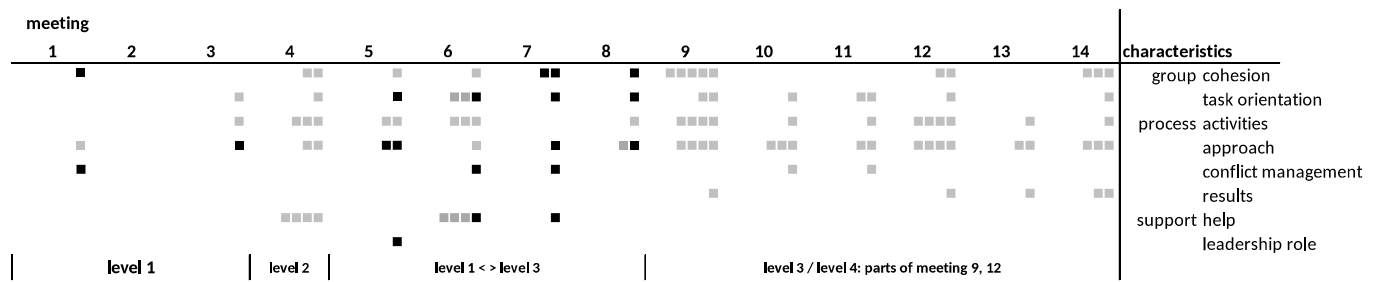


Figure 3: TDT meetings combined with levels of interdependency (Little, 1990)

Table 1: Schedule and content of TDT meetings

meeting	themes
Sept	1 • design: program years 3-4 • process (tasks, appointments)
	2 • process (planning, themes, communication) • design: design guidelines, cross-curricular domains, graduation profiles
Oct	3 • exchange: reasons curriculum change • design: domains, • process (communication) • sharing information (field)
	4 • workshop: AdobeConnect
	5 • peer consultation: curriculum design task
	6 • workshop: AdobeConnect
Nov	7 • process (communication) • design: Graduation requirements, design guidelines • development: technical domains
	8 • process (communication, task agreements) • advice: Graduation requirements, communication • design: assessment, Graduation requirements, domains
Jan	9 • design: design guidelines, graduation profiles • discuss technical courses • process (communication)
Feb	10 • process (preconditions, coordination, support) • design: bottlenecks, assessment plan
March	11 • process (task agreements, responsibilities) • design: electives year 3, year 4 • development: performance assessments
	12 • process (communication, preconditions, decisions) • design: specification design guidelines • sharing information: design guidelines • development: technical course • implementation: electronic learning environment, course descriptions
May	13 • analysis: cross-curricular domains • design: course structure, teacher/student centeredness, • sharing information: design guidelines
June	14 • process (communication) • analysis: flexibility • (re)design domains

Table 2: Participants

teacher educator¹	background	age²	teaching experience²	design experience²	domain within Waterfront College
Inge	Master + teaching certificate	32	5	3	pedagogical
Bettine	Ph.D. + teaching certificate	33	7	1	Work, Experiential, Reflection and Research (WERR)
Harold	Master + teaching certificate	53	27	20	technical: ICT
Maarten	Bachelor + teaching certificate	54	5	5	technical: Electrical Engineering/ Mechanical Technology/ Automotive Technology
Anton	Master	54	20	8	technical: General Technology
Sjoerd	Bachelor + teaching certificate	47	4	2	technical: Building Technology/ Construction Techniques

¹ pseudonym ² in years

Table 3: Coding scheme for nature of collaboration (example)

participant descriptions		characteristics of the nature of the collaboration *				
meeting / statements	personal ^a	group ^b	process ^c	structural ^d	organizational ^e	support ^f
2 3**	I became enthusiastic: developing the WERR domain seemed fine and good, (...)					
5	Often the meetings lacked a strong chairman, we drifted all over the place because topics weren't delineated. Thus, not efficient and certainly not effective. Most of the meetings ended without proper decisions. Besides you have to keep in mind, it wasn't at all clear what topics we could make decisions about.	diffuse goals and tasks ☒	inefficiency & ineffectiveness through unstructured approach ☒	lack of time and planning ☒ mandate not settled ☒		lack of a strong leader ☒
10 11	Here suddenly an overview was presented, the two of you made a scheme. (...)		structured approach +			

^a attitude towards the task, knowledge and skills, self-efficacy, attitude towards collaboration, beliefs / ^b atmosphere, goals/task, cohesion, communication pattern, team composition / ^c group activities, task orientation and approach, progress and results, involvement of others, actual communication / ^d time, mandate, physical facilities / ^e individualistic or collaborative culture / ^f leadership, availability, backing

* + characteristic contributes positively to collaboration; ☒ characteristic contributes negatively to collaboration

** two meetings with one statement: the participant mentioned that his statement applied also to the second meeting

Table 4: Independency – interdependency

Levels	Independency >>>	>>>>>>>>>	>>>>>>>>>	>>>> Dependency
Characteristics	1. Storytelling and scanning for ideas	2. Aid and assistance	3. Sharing ideas and materials	4. Joint work
Group ¹ Process ² Support ³	<i>one way communication:</i> tell about own task; state unrequested opinions; tell about own problems	<i>individual action–reaction:</i> someone asks for opinions / ideas / suggestions; request to do / explore something; positive support	<i>reciprocity:</i> show and discuss materials / documents; discuss pro and cons of decisions; analyze practices; observe lessons; reflect on experiments; structured way of working	<i>unity:</i> team proposals; team actions; collaborative design activities; decision-taking about curriculum/tasks; solve problems; make / use own TDT protocols

¹ task orientation, cohesion; ² group activities, task approach, results, conflict management; ³ (internal TDT) help, leadership role

Table 5: Perceptions of the curriculum – coding scheme

curriculum elements*	evaluation**	statements
rationale	☒	The curriculum is less flexible than thought and perhaps than intended.
aims and objectives	+/☒	I became aware of the complexity of the WERR domain, its coherence and the connections with other domains.
content	☒	Commotion commences about pedagogical courses X and Y.
teacher roles	+	I like the blend of face-to-face and online teaching.
materials and resources	☒	The website is well-designed, but it is not what we agreed upon.
grouping	+/☒	Face-to-face meetings still can be part of a blended curriculum.
learning environment	+/☒	The blended structure leads to discussions.

* the curriculum elements learning activities, time, and assessment were not present in the perceptions of the curriculum

** + perception positively coded; ☒ perception negatively coded

Declaration of Interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

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