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Assessing social configurations in teacher learning groups: the ‘Dimensions of Social Learning Questionnaire’

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ABSTRACT

Increasingly, teacher learning groups (TLGs) are being deployed as a way to realise high-quality educational designs. There is a need for monitoring and for insights into the development of TLGs. Therefore, in the present study, the ‘Dimensions of Social Learning Questionnaire’ (DSL-Q) is developed that can be used to map the social configuration of TLGs. This article describes the validation of the questionnaire for student teachers, teacher educators and in-service teachers ($n = 488$) by means of successive exploratory and confirmatory factor analysis, resulting in an instrument with good psychometric properties. The final version of the questionnaire contains 13 items, divided into three factors: practice integration, long-term orientation and goals, and shared identity and equal relationships. The instrument is suitable for quantitative research to gain more insights into the conditional and the outcome variables of social learning. Future research can incorporate theoretical dimensions regarding the value of the social learning process and its outcomes as well as insights concerning socially shared regulation of learning.

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Collective learning, teacher learning groups; social configuration; teacher education; questionnaire validation

1. Introduction

In contemporary education, we expect teachers to anticipate educational change, preferably with colleagues (Hargreaves et al. 2013). Therefore, teacher collaboration is increasingly being initiated by schools to provide opportunities for teachers to play an active role in constructing knowledge together (Van Schaik et al. 2019). Within the general concept of teacher collaboration, the literature uses a variety of terms to represent forms of collective learning such as professional learning communities, communities of practice, teams and groups (Vangrieken et al. 2015). Although the terms represent different foci, they all refer to teacher collaboration as a social learning process that takes place within a social configuration that is embedded in schools and linked with school-wide capacity for improvement (Sleegers 2013; Vangrieken et al. 2015; Van Schaik et al. 2019).

One of the manifestations of collective learning is teacher learning groups (TLGs) which are built upon notions of network learning (i.e. development of connections), community

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learning (i.e. identity development) and team learning (i.e. formal learning structures) as the main perspectives (Van Schaik et al. 2019; Vrieling-Teunter, Van den Beemt, and de Laat 2016). The term TLGs is broadly defined because collective learning often demonstrates mixed phenomena of social learning in groups of learners that are found to influence a group's ability to put theory into practice (Doornbos and De Laat 2012). TLGs can be defined as social configurations where teachers undertake learning activities in collaboration with colleagues, resulting in a change in cognition and/or behaviour at the individual and/or group level (Doppenberg, Bakx, and Den Brok 2012). TLGs are generally heterogeneous in composition (Vrieling-Teunter, Hebing, and Vermeulen 2021), involving student teachers, teacher educators and in-service teachers. Working in TLGs intertwines school development and teacher professionalisation, thus explaining their increasing popularity (Van Schaik et al. 2019). Teachers in TLGs use different sources to collectively construct knowledge, such as colleagues' practical knowledge, educational research literature, external expert knowledge, and collaborative research activities (Van Schaik et al. 2019). In this way, teachers deal with educational change and problems that are too complex to solve individually (Hargreaves et al. 2013).

Co-construction of knowledge in TLGs is not easy and requires facilitation (De Jong, Meirink, and Admiraal 2021). The presence of support from a TLG facilitator in activities, such as in the planning of the meetings and reminding teachers of previous agreements, is important for collective learning (Hanraets, Hulsebosch, and De Laat 2011; De Jong, Meirink, and Admiraal 2021). Therefore, Vrieling-Teunter, Van den Beemt, and de Laat (2016) developed the 'Dimensions of Social Learning (DSL) Framework' (Table 1) to facilitate TLGs in assessing their social configuration to improve learning processes within TLGs. In line with the rationale of TLGs, the framework is informed by a literature review that applied notions of network, community and team perspectives, all highlighting that learning is a process of constructing meaning in interaction with the social context (Wenger, Trayner, and De Laat 2011). For TLGs, it can be of use to view their social configurations from an overarching social learning point of view. For instance, a shared vision is important for TLGs because it gives direction to activities and binds members in the purposefulness of their actions (Wenger, Trayner, and De Laat 2011). The DSL Framework includes four dimensions (Table 1), each consisting of two to four indicators (Table 1) showing the extent to which TLGs present specific attitudes and social behaviour. In this way, the framework gives a 'snapshot' of TLGs' social learning at a certain point in time. Below, the framework is briefly outlined. For more details, see the review by Vrieling-Teunter, Van den Beemt, and de Laat (2016).

The first dimension, *Practice*, indicates the necessity for a relationship between the knowledge created and shared in the group and teachers' day-to-day activities. This dimension distinguishes two indicators: (1a) 'integrated or non-integrated activities', representing the extent to which TLG knowledge and activities are integrated in their practice; and (1b) 'temporary or permanent activities', which describes the social learning attitude as reflected in the duration or sustainability of learning activities. *Domain and value creation*, the second dimension, is referred to as the sharing of experience and expertise among group members. Key indicators are as follows: (2a) 'sharing or broadening/deepening knowledge and skills', reflecting the extent to which the group develops collective knowledge and skills through dialogue and (2b) 'individual or collective value creation', which describes the developed level of shared value, such as group

Table 1. DSL Framework Including the Original 30 Items.

Dimensions	Indicators	Items
1. Practice	1a. Integrated or non-integrated activities	1. Agreements about testing group products in classroom practice 2. Communication about experiences with group products 3. Integration of group products in local practice 4. Integration of group products outside local practice 5. Conversation about short- and long-term goals
	1b. Temporary or permanent activities	6. Description of short- and long-term goals 7. Relationship between group goals and activities 8. Time investment of group members outside group meetings
2. Domain and value creation	2a. Sharing or broadening/ deepening knowledge and skills	9. Discussion about group products 10. Feedback opportunities 11. Adjustment of group products after discussion or feedback 12. Shared agenda
	2b. Individual or collective value creation	
3. Collective identity	3a. Shared or unshared identity	13. Informal group activities that enhance shared identity 14. Feeling of belonging to the group 15. Contact between group members outside group meetings
	3b. Weak or strong ties	16. Frequent interaction between group members during the meetings 17. Reciprocal relationships between group members 18. Contacts between group members and experts 19. Long-term learning attitude
	3c. Task executors or knowledge workers	20. Interest in ideas and experiences of group members in relation to group goals
4. Organization	4a. Directed or self-organised activities	21. Reflective quality of the group (discussing questions like: what went good and why? What can be improved and how?) 22. Divided roles 23. Voluntary participation
	4b. Local or global activities	24. Inward focus towards local activities 25. Orientation towards external knowledge sharing 26. Sense of equality between group members
	4c. Hierarchic or equal relationships	
	4d. Shared or non-shared interactional norms	27. Group atmosphere that enhances equality 28. Communication about the procedure to achieve shared goals 29. Feeling of safety to interact within the group 30. Openness to different perceptions within the group

ownership, mutual inspiration, or positive interdependence. When group members work interdependently with a shared purpose and responsibility for collective success, the group can demonstrate a *Collective identity*. This third dimension can be characterised by (3a) ‘shared or unshared identity’, which is related to group history and social and cultural background; (3b) ‘weak or strong ties’, which reflects the sense and intensity of general contact among group members, and (3c) the extent to which group members perceive each other as ‘task executors or knowledge workers’. The final dimension, *Organization*, exhibits how the group is organised and can be indicated by (4a) the extent to which the group shows ‘directed or self-organised activities’; (4b) the focus on ‘local or global activities’; (4c) the presence of ‘hierarchic or equal relationships’, and (4d) the extent to which the group shows a shared interactional repertoire, reflected in ‘shared or non-shared interactional norms’.

Earlier findings of De Laat, Vrieling-Teunter, and Van den Beemt (2016) within Dutch pre-service teacher education showed that the framework suited the analysis of TLGs' social configurations. TLGs were able to get a picture of the social configuration of the group based on the framework. This led to greater awareness of the social learning processes and supported TLGs in their social learning activities. Although the original framework indicators were visible and recognisable, they were formulated in a manner that appeared too abstract for independent use by TLG facilitators. Therefore, De Laat, Vrieling-Teunter, and Van den Beemt (2016) developed the framework towards a biographical interview. Biographical interviews (Bornat 2008) are interviews during which respondents are asked to look back over a period of time and narrate experiences related to a certain topic, in this case, the TLG.

The study of De Laat, Vrieling-Teunter, and Van den Beemt (2016) also displayed that the participating teachers were looking for an instrument that can be used to follow the group process and development over a longer period of time with several measurements that are less time-consuming than the interviews. Therefore, the indicators of the DSL Framework were translated into 30 descriptions that were applied in practice during several TLG projects (Table 1). Validation of these 30 items is necessary for broader use than the current self-diagnostic purpose in TLGs. Thus, there is need for an instrument that draws a picture of the social configuration of TLGs and is optimally efficient to enhance teachers' response rate. The instrument must be applicable as a survey instrument when the social configuration is a dependent variable, to get more general insight on conditions that are related to social configurations. And as an independent variable, to gain more clarity into how social configurations affect the outcome of TLGs. In this way, a broader understanding of how TLGs function for the various participants is created. Overall, the aim of this study is to validate the quantitative instrument that assesses social configurations in TLGs, as a next stage in the development of a reliable instrument.

2. Method

2.1. Samples

The DSL Questionnaire (DSL-Q), was distributed in TLG meetings within four pre-service teacher education colleges in different regions in the Netherlands. These institutes formed TLGs on various educational topics (e.g. giftedness), all consisting of student teachers of different years (from now on students), teacher educators, and in-service teachers (from now on teachers). The data were anonymously gathered in compliance with ethical norms; all participants provided active informed consent and participated voluntarily. The participants could withdraw from the study at any time. Responses were gathered from academic year 14/15 to 19/20 (219 students, 290 teachers). The DSL-Q aimed to measure social configurations of TLGs via 30 questions (Table 1). Participants indicate the applicability of their experiences in a TLG (e.g. 'discussion about group products') on a four-point scale (1 'not applicable' to 4 'entirely applicable'). Items are hypothesised to measure 11 distinct indicators, which in turn measure four higher dimensions (Table 1).

Although it is important for students to join TLGs as equal participants to prepare them for their profession, students should develop the skills and competencies needed

to function in these constellations of working and learning together (Elster et al. 2014). Thus, students have yet to develop the necessary skills for social learning and may have a different role than the more experienced participants. For example, students as novices do not see themselves as being equal to the teachers which may influence their perceptions of the social configuration (Table 1, indicator 4c, 'the presence of hierarchic or equal relationships'). Therefore, it is interesting to consider possible differences in perception between students and teachers in the analyses of the DSL-Q. Also, gender might be of importance in exploring validity in educational settings (Martin 2007). Because our sample included a large group of missing data for gender, a three-group distinction was made in the analyses (male, female, missing). Another interesting angle is potential differences between institutes because of different cultures and experiences. Therefore, this was included as a grouping variable in factor analyses. The TLG level could also be interesting as a grouping variable, but was not included in the analyses because it did not meet sample size requirements for separate analyses (Maas and Hox 2005).

2.2. Data analysis

2.2.1. Confirmatory factor analysis for initial model

To examine how the acquired data fits the initial model (Table 1), confirmatory factor analysis (CFA) was conducted with Jamovi (v1.2) and MPlus (v8.5) using maximum likelihood method for data extraction. The sample consisted of 488 respondents, 219 students (41 male, 99 female, 79 no gender data) and 269 teachers (48 male, 221 female). Model fit was determined by X^2 statistic, normed Chi square (NC), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR). CFA models were compared by computing ΔX^2 , where $p \leq .05$ indicates a significant improvement of the model.

The X^2 test should be non-significant, where smaller values indicate better model fit (Gatignon 2010). As X^2 is highly dependent on sample size, NC (X^2/df) is considered with values of 3.00 or less indicating a better fit (Hair et al. 2010). For RMSEA, values indicate a good- (<0.05), fair- (>0.05, <0.08), mediocre- (>0.08, <0.10), and poor-fit (>0.10), respectively (Hu and Bentler 1999). For CFI and TLI, values above 0.90 and 0.95 are considered acceptable and excellent fits (McDonald and Marsh 1990). For SRMR, a value below 0.08 is considered a good fit (Hu and Bentler 1999). As the research was done in a real-life educational context, subsamples were based on cohorts within academic years which did not allow for (e.g.) random sampling.

2.2.2. Subsample 1 exploratory factor analysis

Subsample 1 consisted of 258 respondents, 49 students (11 male, 37 female, 1 missing information) and 209 teachers (35 male, 174 female), to perform EFA using maximum likelihood method. Parallel analysis was used to determine the number of factors (Zwick and Velicer 1986) with oblimin rotation (Costello and Osborne 2005).

2.2.3. Subsample 2 confirmatory factor analysis

Subsample 2 consisted of 230 respondents, 170 students (30 male, 62 female, 78 missing information) and 60 teachers (13 male, 47 female). This sample was used for CFA, to confirm validity of the factor structure found in EFA.

3. Results

3.1. Initial model fit

The 30 items from the initial model showed a poor fit, with $\chi^2 = 2057$ ($df = 399$, $p = <.001$), $NC = 5.16$, $RMSEA = 0.09$, $CFI = 0.73$, $TLI = 0.71$, and $SRMR = 0.11$. Therefore, subsamples were created to perform exploratory factor analyses (EFA) to explore factor structures, and CFA to confirm the structures found in the EFA.

Table 2. Sample 1 EFA Highest factor Loadings.

Item	Initial EFA model			Final EFA model		
	Factor			Factor		
	1	2	3	1	2	3
13. Informal group activities that enhance shared identity	0.564			0.552		
14. Feeling of belonging to the group	0.499			0.497		
17. Reciprocal relationships between group members	0.710			0.703		
19. Long-term learning attitude	0.557			0.546		
20. Interest in ideas and experiences of group members in relation to group goals	0.662			0.662		
21. Reflective quality of the group (discussing questions like: what went good and why? What can be improved and how?)	0.596			0.574		
22. Divided roles	0.525			0.506		
26. Sense of equality between group members	0.727			0.728		
27. Group atmosphere that enhances equality	0.655			0.669		
28. Communication about the procedure to achieve shared goals	0.599			0.600		
29. Feeling of safety to interact within the group	0.666			0.686		
30. Openness to different perceptions within the group	0.599			0.607		
1. Agreements about testing group products in classroom practice		0.831			0.827	
2. Communication about experiences with group products		0.838			0.823	
3. Integration of group products in local practice		0.870			0.859	
4. Integration of group products outside local practice		0.606			0.578	
9. Discussion about group products		0.802			0.811	
10. Feedback opportunities		0.473			0.474	
11. Adjustment of group products after discussion or feedback		0.852			0.857	
5. Conversation about short- and long-term goals			0.792			0.804
6. Description of short- and long-term goals			0.843			0.856
7. Relationship between group goals and activities			0.540			0.522
8. Time investment of group members outside group meetings			0.217		Removed	
12. Shared agenda			0.311		Removed	
	1	2	3	1	2	3
15. Contact between group members outside group meetings	0.289				Removed	
16. Frequent interaction between group members during the meetings	0.266				Removed	
18. Contacts between group members and experts	0.367				Removed	
23. Voluntary participation	0.335				Removed	
24. Inward focus towards local activities	0.368				Removed	
25. Orientation towards external knowledge sharing		0.399			Removed	

Table 3. Subsample 1: Final EFA Correlation Matrix.

	1	2	3
1	—	0.265	0.439
2		—	0.284
3			—

3.2. Subsample 1: EFA

The initial 30 items were subjected to EFA which led to a three-factor solution (Table 2). Kaiser–Meyer–Olkin (KMO) overall measure of sampling adequacy was .866, no items below .70 (‘great’, Hutcheson and Sofroniou 1999). Correlations between items were sufficiently large for factor analysis as indicated by Bartlett’s test of sphericity ($X^2 = 2610$, $df = 435$, $p = < .001$). Items with factor loadings ≤ 0.40 were considered to load insufficiently (Costello and Osborne 2005) and were removed one by one until all loadings were ≥ 0.40 . The remaining 22 items were again subjected to EFA leading to a three-factor solution; KMO overall measure was .868; no items $\leq .70$; sphericity was again sufficient; Bartlett’s test $X^2 = 2182$, $df = 231$, $p = < .001$. This three-factor solution accounted for 50.8% of the variance (Table 2). From a content perspective, three principles emerged: (1) the selected items had to do justice to the three factors; (2) the practice instrument had to be quick to administer and therefore not contain any overlapping items; (3) the items had to be evenly distributed over the factors.

Factor 1 consisted of 12 items, from indicators ‘shared or not shared identity’ (items 13 and 14), ‘weak or strong ties’ (item 17), ‘task executors or knowledge workers’ (items 19 and 20), ‘directed or self-organised activities’ (items 21 and 22), ‘hierarchic or equal relationships’ (items 26 and 27), and all three items from indicator ‘shared or non-shared interactional norms’ (items 28 to 30). Factor 2 consisted of seven items, four of which (items 1–4) originally related to the indicator ‘integrated or non-integrated activities’ and the other three items (9–11) were derived from the indicator ‘sharing or broadening/deepening knowledge and skills’. Factor 3 consisted of three items (5–7), all related to the indicator ‘temporary or permanent activities’. Correlations between factors indicate they measure similar but separate dimensions of social learning (Table 3).

3.3. Subsample 2: CFA

3.3.1. Model fit

Table 4 provides fit indices for the CFA models. The final EFA model was first tested on subsample 2. Model fit for CFA model 1 was not acceptable; four items (10, 19, 22, 28)

Table 4. Subsample 2 CFA Fit Indices for the DSL-Q.

Subsample	Model	Items	Items removed	X^2	df	ΔX^2	Δdf	p	NC	RMSEA	CFI	TLI	SRMR
2	1	22		541	206			<.001	2.63	0.08	0.86	0.84	0.09
	2	18	10, 19, 22, 28	260	132			<.001	1.96	0.07	0.93	0.92	0.06
	2 vs 1					281	74	<.001					
	3	13	9, 13, 20, 21, 30	95	62			.004	1.53	0.05	0.98	0.97	0.05
	3 vs 2					165	70	<.001					
	4	12	7, 17	50	41			0.165	1.22	0.03	0.99	0.99	0.04
	4 vs 3					45	21	<.001					

Table 5. CFA Model 3 Fit Indices, Grouping Variables are Gender, Role, and Institution.

Grouping variable		n	χ^2	df	NC	RMSEA	CFI	TLI	SRMR
Gender	Male	43	75.79	62	1.23	0.07	0.94	0.93	0.09
	Female	109	81.50*	62	1.32	0.05	0.97	0.96	0.05
	Missing	78	97.33**	62	1.56	0.09	0.93	0.91	0.08
Role	Student	170	103.74***	62	1.68	0.06	0.96	0.95	0.06
	Teacher	60	72.97	62	1.18	0.05	0.95	0.94	0.07
Institution	Institution 1	162	83.45*	62	1.34	0.05	0.98	0.97	0.05
	Institution 2, 3, & 4	68	93.43**	62	1.50	0.08	0.92	0.90	0.09
		(16, 24, 28)							

Note: for 78 students, data were missing on Gender. To avoid exclusion from the dataset, this was treated as a separate subgroup, even though this technically is not a category within Gender.

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

were therefore removed based on item content and modification indices, leading to a second CFA model. This model showed a better fit and $\Delta\chi^2$ showed a significant improvement, although fit measures were still not acceptable. After a third iteration based on item content and modification indices, five items were removed (9, 13, 20, 21, 30) leading to CFA model 3. Model fit showed a good to excellent fit, $\chi^2 = 151$, $p = <.001$, $df = 62$, RMSEA = 0.08 (fair fit), CFI = 0.96 (excellent fit), TLI = 0.95 (excellent fit), SRMR = 0.05 (good fit).

3.3.2. Gender, role, and institution

Psychometric differences between gender, role, and institution can provide evidence of the DSL-Q's stable validity independent of specific contexts. This was done with gender, role, and institution as grouping variables for CFA model 3 (Table 5). For gender and role, results show good to excellent model fit for all subgroups. This indicates that CFA model 3 is stable, regardless of gender or role in a TLG. Sample sizes for institution were insufficient to examine model fit for all four institutions separately. Therefore, institutions 2, 3, and 4 were combined to be compared with institution 1. Model fit showed overall acceptable fit for institution.

Possible measurement (in)variance was also examined for gender, role, and institution (Table 6). A stepwise approach (configural, then metric, then scalar model) was used in

Table 6. CFA Model 3 Measurement (in)variance between Groups.

Model		χ^2	df	p
Gender	Configural	254.62	186	<.001
	Metric	289.88	206	<.001
	Scalar	332.67	226	<.001
	Metric vs. Configural	35.25	20	.019
	Scalar vs. Metric	42.80	20	.002
Role	Configural	176.71	124	.001
	Metric	198.30	134	<.001
	Scalar	237.52	144	<.001
	Metric vs. Configural	21.60	10	.017
	Scalar vs. Metric	39.22	10	<.001
Institution	Configural	176.88	124	.001
	Metric	188.21	134	.001
	Scalar	204.45	144	<.001
	Metric vs. Configural	11.33	10	.332
	Scalar vs. Metric	16.25	10	.093

Note: for 78 students, data were missing on Gender. To avoid exclusion from the dataset, this was treated as a separate subgroup, even though this technically is not a category within Gender.

Table 7. CFA Model 1,2, and 3 Means, Standard Deviations, and Measures of Internal Reliability.

Model	Factor	Items	M	SD	α
1	1	1-4, 9-11	2.76	0.64	0.846
	2	5-7	2.90	0.68	0.870
	3	13, 14, 17, 19-22, 26-30	3.19	0.47	0.897
2	1	1-4, 9, 11	2.67	0.69	0.853
	2	5-7	2.90	0.68	0.870
	3	13, 14, 17, 20, 21, 26-29, 30	3.22	0.50	0.885
3	1	1-4, 11	2.64	0.71	0.837
	2	5 - 7	2.90	0.68	0.870
	3	14, 17, 26, 27, 29	3.28	0.56	0.858

Table 8. Final DSL-Q Based on CFA Model 3.

Factors	Items
Practice integration	1. Agreements about testing group products in classroom practice 2. Communication about experiences with group products 3. Integration of group products in local practise 4. Integration of group products outside local practise 11. Adjustment of group products after discussion or feedback
Long-term orientation and goals	5. Conversation about short- and long-term goals 6. Description of short- and long-term goals 7. Relationship between group goals and activities
Shared identity and equal relationships	14. Feeling of belonging to the group 17. Reciprocal relationships between group members 26. Sense of equality between group members 27. Group atmosphere that enhances equality 29. Feeling of safety to interact within the group

which equality constraints were added (first equal factor loadings, then equal factor loadings and equal intercepts; cf. Van de Schoot, Lugtig, and Hox 2012). For role and gender, significant differences between the metric and the configural model were found, as well as between the scalar and the metric model. For institution, the metric model did not differ significantly from the configural model, and the scalar model did not differ significantly from the metric model. This means there is good measurement invariance between different institutions.

3.3.3. Internal reliability

Internal reliability for CFA model 3 is expressed by Cronbach’s α Values of $\alpha \geq .90$ are considered excellent, between .90 and .80 good, between .80 and .70 acceptable, between .70 and .60 questionable; however, the more items, the higher the alpha should be (Field 2018). All factors show good internal reliability (Table 7).

Finally, Table 8 presents the definite DSL-Q.

4. Discussion

The current study is part of a long-term project in which a number of steps have already been taken to better facilitate TLGs. First, four dimensions of social learning were extracted from a literature review to develop an instrument. Second, 30 items were constructed to enable validation for research on a larger scale. Third, the instrument was surveyed among respondents who had attended at least one TLG. To validate

thoroughly, two samples were used. First, after insufficient fit on initial CFA, EFA (sample one) resulted in 22 items divided over three factors. Then, to confirm EFA findings, CFA resulted in good fit indices and improved reliability after removing another nine items. However, measurement variances existed for role and gender, suggesting that item interpretation or weight may have differed between these groups. This could be due to small group sizes. Future research can therefore explore how DSL-Q constructs and measurements relate to theoretically linked constructs and other instruments, for empirical validation with larger groups. Furthermore, future research could examine alternative models to fit the data, which may prove additional insights when measuring dimensions of social learning.

The validated DSL-Q with 13 items, provides a picture of TLGs on three distinct factors. Factor 1 (practice integration, five items) originates from the 'practice' dimension with the indicator 'integrated or non-integrated activities'. Factor 2 (long-term orientation and goals, three items) also stems from the 'practice' dimension combined with the indicator 'temporary or permanent activities'. Factor 3 (shared identity and equal relationships, five items) concerns a selection of core items from the original dimensions of 'collective identity' and 'organisation'.

The final DSL-Q does not include the original dimension of 'domain and value creation' with the underlying indicators ('sharing or broadening/deepening knowledge and skills', and 'individual or collective value creation'), except for the item 'adjustment of group products after discussion or feedback' now belonging to 'practice integration'. This implies that the instrument does not address the collective creation of new knowledge and innovation, the importance of which is described by McKenney and Reeves (2018). Perhaps, the indicators belonging to domain and value creation are more part of the TLGs' outcome, than on the configuration itself and thus should be operationalised in a different way, integrating the value creation cycles developed by Wenger, Trayner, and De Laat (2011). Value creation theory focuses on individual perceived value of the participants, while a collective perspective is also highly appropriate for the assessment of the social configuration. Thus, adjustments to the original framework of Wenger, Trayner, and De Laat (2011) are needed to operationalise collective value creation. Therefore, in future research, we will reformulate the current 'domain and value creation' items and supplement them with value creation cycles from a collective perspective. In this way, TLGs can not only monitor their social configuration but also the product side of social learning fitting the discussion about the quality of the designed products that has become increasingly intense in recent years.

The indicators 'Shared and unshared identity' and 'Weak and strong ties' have both only one item in the final factor 'shared identity and equal relationships'. The remaining items 'feeling of belonging to the group' and 'reciprocal relationships between group members' are core components of a shared identity (Van Meeuwen et al. 2020). Therefore, we expect that the eliminated items do not have to be reformulated. With regard to the indicators 'task executors or knowledge workers' and 'local or global activities', which were not included in the DSL-Q, the items could be reformulated simpler and more straightforward and validated in the future research.

Another missing element in the DSL-Q concerns social regulation skills (original indicator 'directed or self-organised activities'). In line with self-regulated learning theories, it is important to look for a balance between control and social regulation in TLGs

(Kirschner, Sweller, and Clark 2006). Without facilitation, it is difficult for TLGs to regulate their learning process. It is therefore essential for group facilitators to gradually diminish their support (scaffolding) during the process (De Laat, Vrieling-Teunter, and Van den Beemt 2016). By way of identifying and modelling the expected behaviours, novices can be guided in developing sufficient social skills (Panadero 2017). The insights of Järvelä et al. (2016) concerning the interaction between self-regulation, co-regulation and socially shared regulation can support the further development regarding social regulation in the DSL-Q.

Overall, the results showed that the remaining items of the DSL-Q cover three dimensions with seven underlying indicators of the original framework, but it has not yet been possible to find valid factors that measure the full scope of the framework. However, the fact that only three factors and 13 items remain does not make this instrument less valuable. The dimensions found, including the separate items, can be used by TLGs as a self-assessment to reflect on the functionality of their own social configuration on the three dimensions. Grounded on this 'snapshot', participants can decide together whether the social configuration fits their goals or should lead to adjustments in the way they work in the short and medium term. For example, a TLG may come to the conclusion that the group products are already being integrated in local practice, but not yet outside local practice, while widespread implementation is among the goals. This can lead to an adjustment of the working method including measuring its effects. Within teacher education, for example, the tool can provide more insight how to support the specific role of students within TLGs. Also, due to the limited number of items, completion takes little time.

Finally, this validated instrument incorporates important characteristics of social configurations of TLGs as was found in literature as well as practice, and can be viewed as a first exploratory step in the research on this phenomenon. It presents a promising, user-friendly alternative to monitor social learning in TLGs that is regarded as a stimulus for professional development.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Ethics declarations

The research was ethically approved by the cETO committee of the Open Universiteit under number U/2019/09081/MQF.

Data availability statement

The data supporting the findings of this study are available on request from the corresponding author.

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