Measuring learners' perceptions of a team-taught learning environment : development and validation of the Learners' Team Teaching Perceptions Questionnaire (LTTPQ)

Measuring learners' perceptions on a team taught learning environment: Development and validation of the Learners' Team Teaching Perceptions Questionnaire (LTTPQ)

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Abstract

Team teaching is a teaching model in which teachers work collaboratively in the preparation, teaching and evaluation of a course. Literature suggests that team teaching potentially provides rich and varied lessons, increased support and learning gains. However, team teaching may possibly also cause some confusion. To support the implementation of team teaching, stakeholders (teachers and policy makers) require an instrument offering insights to support their decision making. The present study describes the development and validation of an easy-to-use questionnaire to explore learners' perceptions of team teaching. The questionnaire was developed and validated in four stages: an extensive literature review (1) resulted in a preliminary version of the questionnaire (2) containing advantages and disadvantages for learners of team teaching. Next, a pilot (3) was conducted, followed by a validation study (4) based on confirmatory factor analysis in two different learning environments: secondary education (Belgium, n = 229 pupils) and higher education (South Africa, n = 350 students). The final questionnaire comprises of 16 items and four factors and appears to be valid, internally consistent and reliable.

Keywords team teaching; learners' perceptions; questionnaire development; questionnaire validation

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Introduction

Education continues to be characterized by learning environments where individual teachers take sole responsibility for their classes (Deneire et al. 2012; Struyf et al. 2012; Vanblaere and Devos 2016) with little or no cooperation with other teachers. This isolation of teachers may impair learning opportunities for both the teachers and their learners (i.e. pupils, students or trainee teachers) (Deneire et al. 2013). Education institutions, including schools (both primary and secondary) and higher education institutions, are, therefore, seeking teaching models in which teachers are more committed to collaborating, sharing expertise and experiences, supporting each other, learning collaboratively, and enhancing their own competencies (Millis 2012; Musanti and Pence 2010; Solis, Vaughn, Swanson and Mcculley 2012). These collaborative models can enhance the learning environment by assisting teachers in responding better to learners' needs through, for example, differentiated instruction, and potentially result in improved learning outcomes (Sorensen 2004).

Team teaching is a collaborative teaching model that refers to "two or more teachers working together in some level of collaboration in the planning, delivery, and/or evaluation of a course" (Baeten and Simons 2014; Carpenter et al. 2007; Dugan and Letterman 2008; Welch 2002). Co-teaching, collaborative teaching and cooperative teaching are sometimes used synonymously with team teaching. Team teaching, however, refers to the collaboration between teachers in order to provide good education to *all* learners, while the other concepts, e.g. co-teaching, may in some instances be more narrowly defined to refer to the collaboration of a (general) teacher with a special education teacher in order to help specific learners with specific educational needs (Cook and Friend 1995; Kamens 2007; Mastropieri and Scruggs 2014). Team teaching, as a broader concept, refers to collaboration by two or more teachers, in all possible subjects, from one specific grade or between several grades and may include collaboration, such

as that between a (general) teacher and a special education teacher, a clinical teacher and a student teacher, two student teachers, a student teacher and a teacher trainer etc.

Globally, five models, which differ from one another in the extent of collaboration between the teachers, can be distinguished (Baeten and Simons 2014). These five models are: 1) the observation model, 2) the coaching model, 3) the assistant teaching model, 4) the equal status model and 5) the teaming model (Figure 1).

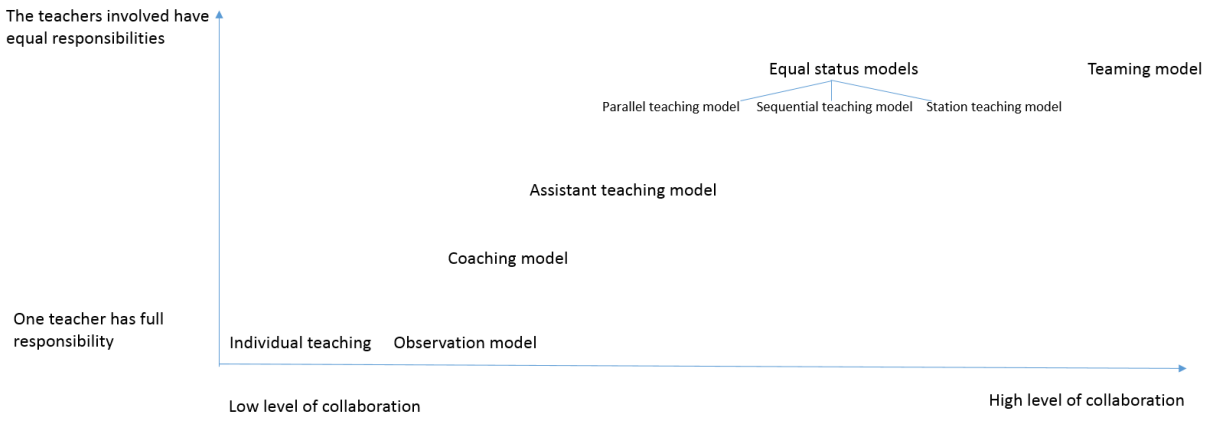

Figure 1. Team Teaching Models

In the observation and coaching models, collaboration is limited as one teacher has full responsibility while the other teacher observes (Badiali and Titus 2010; Graziano and Navarette 2012) or coaches (Austin 2001; Nevin, Thousand and Villa 2009). A higher level of collaboration is evident in the assistant teaching model, where one teacher has the main responsibility, but is assisted by another teacher who provides support to the learners, uses media etc. (Badiali and Titus 2010; Thousand, Villa and Nevin 2006). Several teaching formats are possible in the equal status model: teachers split up the class group (parallel teaching) (Thousand et al. 2006), they divide the learning contents or activities (sequential teaching) (Dugan and Letterman 2008; Helms et al. 2005) or they split up the learning contents or activities as well as the class group, so that both teachers, with the same status and

responsibilities, teach specific content or activities to a subgroup of learners (station teaching) (Akerson and Montgomery 2017; Cook and Friend 1995; Badiali and Titus 2010). Finally, in the teaming model, both teachers fully work together: during the preparation, the delivery and the evaluation of the lessons. The learning environment is characterized by both teachers being present in class and actively involved in teaching with extensive interaction and dialogue between them (Badiali and Titus 2010; Helms et al. 2005).

Research on team teaching shows that it offers several benefits to both teachers and learners. Teachers share and strengthen their own and each other's expertise (Bronson and Dentith 2014; Carless 2016); they work in a less isolated way (Chanmugan and Gerlach 2013; Murata 2002), are presented with more learning opportunities and can grow on a professional and personal level (Baeten and Simons 2014; Chanmugan and Gerlach 2013). Additionally, together they are more able to facilitate learning in bigger class groups (Bronson and Dentith 2014; Graue, Hatch, Rao and Oen 2007). Team teaching, however, may have some possible disadvantages for teachers, such as higher workload and incompatibility between colleagues (Tobin et al. 2001; Gardiner and Robinson 2011; Nokes, Bullough, Egan, Birrell and Hansen 2008).

In a team teaching environment, learners learn by interacting and collaborating with their teachers and each other and by observing their teacher team's interactions (Topping 2005). The learning experience becomes richer when they are confronted by multiple teaching styles and perspectives on the course material (Tobin, Roth and Zimmermann 2001; Nokes et al. 2008). Moreover, when an additional teacher is present in class, learners receive quicker assistance (Gardiner 2010), support, and more individual attention (Birrell and Bullough 2005). However, learners may become confused when faced with more than one teacher in class, particularly when they give differing instructions and responses to the same question (Baeten

and Simons 2016). Confusion is the most reported disadvantage in the literature (a.o. Bullough et al. 2003; Goodnough et al. 2009; Kamens 2007, Nokes et al. 2008).

When implementing new teaching models, it is important to consider the perspective of all actors involved, including the learners, not only to provide insight into approaches to learning but also into learning outcomes. To date, the literature on team teaching has primarily focused on the teacher's perspective thereof rather than on the learners' perspective. When the latter perspective is considered, it is usually measured indirectly, via the teachers' perceptions (e.g., Sorensen 2004; Smith 2004). While it is important to gain an understanding of the potential advantages and disadvantages of team teaching from the teacher's perspective, an instrument is needed that can be used to monitor the team teaching process from the perspective of the learners as key actors in the learning environment. If learners perceive team teaching as being negative, this might function as a filter (Pajares 1992) and complicate their acceptance of the teaching model (Keefe, More and Duff 2004), which could impair their learning and their learning outcomes (Entwistle 1991; Zeegers 2001). An instrument to evaluate team teaching may provide teachers and policy makers with valuable insights to support their decision whether to adopt or continue team teaching. Further, it may be a useful tool for teachers to evaluate learning experiences facilitated by team teaching in class. Teachers who experiment with different models of team teaching (observation model, coaching model etc.) can use the instrument to determine which model is most suitable for their learners and for the specific topic.

Therefore, the aim of this study is to develop an easy-to-use instrument to measure learners' perceptions in a team taught learning environment. The instrument should be suitable for use in various learning settings (primary, secondary, higher and adult education; regular and special education) and will, therefore, be validated in different learning environments. In the present study, we focus on secondary and higher education and validation of the instruments in

two countries (Belgium and South Africa). Future research may consider other learning environments. An additional objective of this study is to further explore the advantages and disadvantages perceived by learners in order to provide further illumination of the possible benefits and challenges of team teaching.

Method

The development of the instrument is firstly discussed, before the validation thereof in two different learning environments (secondary and higher education), with different subjects, in two different countries (Belgium and South-Africa).

Development of the instrument

The Learners' Team Teaching Perceptions Questionnaire (LTTPQ) was developed and validated in four stages. During the first stage, an extensive literature review was carried out in order to make an inventory of all relevant advantages and disadvantages of team teaching for learners (Baeten and Simons 2014). Five electronic databases (ERIC, FRANCIS, PsychInfo, Scopus, and Web of Science) were searched with the following terms: "team teaching", "co-teaching", "cooperative teaching", "collaborative teaching" and "paired placement". By reading the abstracts of the retrieved manuscripts, relevant manuscripts were identified. In addition, the reference lists of those manuscripts were explored in order to search for other relevant manuscripts. The following criteria for inclusion were applied: (1) The literature search was limited to the years 2000-2013. One publication before this period, i.e. Cook and Friend (1995), was included because of its significant value to the literature on team teaching (Baeten and Simons 2014); (2) In order to ensure the quality of the review study, manuscripts had to be peer reviewed.

The literature review resulted in a corpus of 33 peer-reviewed manuscripts (Baeten and Simons 2014). These manuscripts were read thoroughly in order to search for advantages and disadvantages of team teaching, which were coded into themes. The coding process was data-driven, based on the reading of the literature (Baeten and Simons 2014). The following table offers an overview of the advantages and disadvantages team teaching can have for learners, as well as the main references for each advantage and disadvantage that was retrieved from the literature.

Table 1 Advantages and disadvantages of team teaching for learners retrieved from the literature

Advantages	**Main references**
- Rich and varied lessons (i.e. variety of teaching styles, multiple perspectives on topics)	Bullough et al. 2002, 2003; Gardiner 2010; Goodnough et al. 2009; Nokes et al. 2008; Smith 2002, 2004, Tobin et al. 2001
- Increased support (i.e. individual attention, less waiting time for assistance, more differentiation, additional observation information on learning problems)	Birrel and Bullough 2005; Bullough et al. 2003; Dee 2012; Gardiner 2010; Goodnough et al. 2009; Kamens 2007; Nokes et al. 2008; Smith 2002, 2004; Sorensen 2004
- Learning gains (i.e. higher test scores, higher quality of school work, better understanding)	Nokes et al. 2008; Sorensen 2004
Disadvantages	**Main references**
- Confusion (e.g. different responses to same question, different expectations)	Bullough et al. 2003; Goodnough et al. 2009; Kamens 2007

In the second stage, the inventory was refined through peer debriefing (i.e. two teacher educators) and transformed into a preliminary questionnaire to measure learners' perceptions of the advantages and disadvantages they experienced in a team-taught course. The items in the questionnaire were based on the underlying themes for advantages and disadvantages retrieved from the literature (see Table 1) i.e. rich and varied lessons, increased support, learning gains and confusion. Items, retrieved from the literature, were created for each theme for example, an item 'I dared to ask questions more quickly' for the theme 'Increased support'.

To confirm the link between the items and the underlying themes, six teacher educators were invited to code the items on the basis of these possible underlying themes.

The inventory (in Dutch) was then submitted to a group of fourteen student teachers of the University of Antwerp (Belgium), who applied team teaching during their field experiences. They were invited to assess the preliminary questionnaire and to check that the items were clearly formulated (are all items open to one interpretation only?), relevant (are all items related to team teaching and the underlying themes?), unique (are all items distinct from the others?) and universal (are all items understandable in all contexts?). This resulted in only minor amendments.

During the third stage, two learners (two 16-year-old girls), were asked to complete the questionnaire and provide feedback on clarity and length, also resulting in only minor changes. The pre-validation questionnaire consisted of 18 items, arranged in random order. To measure the learners' agreement with each statement, a five-point Likert-scale, with response categories ranging from 1 (completely disagree) to 5 (completely agree) was provided. The following table gives an overview of the items included in the questionnaire as well as of the underlying themes. The items, initially in Dutch (in italics in Table 2), were translated by a sworn translator and controlled by our English-speaking South African colleagues, who are also fluent in Afrikaans, a language derived from Dutch.

Table 2 Learners' Team Teaching Perceptions Questionnaire (LTTPQ)

To what extent do you agree with each of the following statements? (1 = Completely disagree; 5 = Completely agree).	Underlying theme
Because we got lessons from two teachers… (in secondary education) Because we were taught by two lecturers simultaneously… (in higher education)	
Door de les te krijgen van twee leerkrachten…	
1. I dared to ask questions more quickly. *durfde ik sneller vragen te stellen.*	Increased support
2. it was more difficult for me to pay attention. *vond ik het moeilijker om op te letten.*	Confusion
3. the course was/the lectures were more interesting. *was de les interessanter.*	Rich and varied lessons

4.	the atmosphere in the classroom was more relaxed. *was de sfeer in de klas meer ontspannen.*	Rich and varied lessons
5.	it was easier for me to concentrate. *kon ik me makkelijker concentreren.*	Rich and varied lessons
6.	I received more (individual) attention. *kreeg ik meer (individuele) aandacht.*	Increased support
7.	I received support faster. *werd ik sneller geholpen.*	Increased support
8.	I sometimes missed some structure in the lesson/lecture. *miste ik soms wat structuur in de les.*	Confusion
9.	I understood the course contents more quickly. *begreep ik de leerstof sneller.*	Learning gains
10.	it was noticed more quickly that I did not understand something. *werd sneller opgemerkt dat ik iets niet begreep*	Increased support
11.	time was unnecessarily lost. *ging er soms onnodig tijd verloren.*	Confusion
12.	I paid more attention during the course/lecture. *had ik meer aandacht voor de les.*	Rich and varied lessons
13.	learners chatted more among each other. *werd er onderling meer gebabbeld door de leerlingen.*	Confusion
14.	I remembered more from the lesson/lecture. *heb ik meer van de les onthouden.*	Learning gains
15.	Lessons were more varied. *was er veel afwisseling in de les.*	Rich and varied lessons
16.	I was less distracted. *was ik minder afgeleid.*	Rich and varied lessons
17.	I fear that one teacher will give higher scores than the other. *vrees ik dat de ene leerkracht meer punten zou geven op een toets dan de andere.*	Confusion
18.	the quality of the lessons improved. *kreeg ik beter les.*	Rich and varied lessons

In addition to the items, three open-ended questions were posed to the learners: (1) Would you like to be taught in this way in the future? (2) Give at least one advantage and one disadvantage of this teaching format; and (3) Do you have any remarks about the lesson(s)/lecture(s)? These questions were not intended to form part of the final LTTPQ but were asked to gain qualitative insights from the learners as validation of the quantitative items to be included in the final LTTPQ, as well as to further explore the possible benefits and challenges of team teaching and their relative importance.

Validation study of the LTTPQ

In the fourth and final stage, with the aim to validate it, the questionnaire was completed by two samples of students in two different learning environments (secondary and higher

education), in two different countries (Belgium and South Africa) and in different subjects, in order to reflect the variety of learning environments team teaching is applied in.

Table 3 Overview of the validation learning environments

Learning environment	Country	Education level	Subjects	$N_{Learners}$	$N_{Team\ taught\ lessons}$
Environment 1	Belgium	Secondary	Total	**229**	
			Human Sciences	92	4
			Languages	69	4
			Biology	68	4
Environment 2	South-Africa	Higher	Accounting	**350**	38

In learning environment 1, the questionnaire was completed by 229 learners: 150 girls (65.5%) and 79 boys (34.5%) from different schools for secondary education in Flanders (Belgium). Their average age was 17.1 years (SD = 1.17). In each participating school, Master degree students, from a one-year academic teacher education program, team taught several lessons as part of their initial field experience, in three different subjects (see Table 3). Team teaching was applied either with the sequential (n = 121) or the parallel teaching model (n = 108) during four lessons.

In learning environment 2, the questionnaire was completed by 350 students, of which 209 (59.7%) were female and 141 male (40.3%), enrolled for Accounting at the University of Pretoria (South Africa). Their average age was 20 (SD = 0.84). The course contained 38 team taught lectures based on the teaming model.

In both learning environments, the participants received the questionnaire after the final team taught lesson or lecture. All secondary school learners involved (n = 229) completed the questionnaire and no missing answers were registered. The response for the university students was 71% (n = 350 of 491 enrolled students). To explore for possible non-response bias, a comparative analysis of the profile of the respondent group and the targeted population revealed no significant differences in terms of the respondent gender and age (untabulated). Despite this,

the potential for non-response bias should be considered when interpreting the results. Within the responses of the participating 350 students, no missing answers were registered.

Analysis

Analysis of the questionnaire

In order to investigate the underlying data structure of the items, a confirmatory factor analysis (CFA) was conducted separately for each learning environment, given the important differences between these learning environments (different socio-cultural context, different educational level, different teachers). CFAs were conducted by means of the R project, a free software environment for statistical computing and graphics (https://www.r-project.org/).

Firstly, CFA was conducted on the basis of the theoretically expected model i.e. a model with 18 items and four underlying themes (see Table 2). Next, the fit indices, the correlations between the factors, and low factor loadings of individual items were evaluated, searching for models with the best fit (less items or less factors).

Both in the Belgian and in the South African context, a model including four factors showed the best fit indices. The following table (Table 4) gives an overview of the fit indices of this final model. In both contexts, two items (i.e. item 13 "learners chatted more among each other" and 17 "I fear that one teacher will give higher scores than the other") showed low factor loadings: in the Belgian data (Item 13 = 0.352; Item 17: 0.208); in the South-African data (Item 13 = 0.319; Item 17 = 0.322). Therefore, these items were left out of the final model.

One item (i.e. item 10 "it was noticed more quickly that I did not understand something", see Table 6) showed a low factor loading in the Belgian data (.254), but an adequate loading in the South African data (.573), therefore the item was kept in the final model.

Table 4 Characteristics and fit indices of the final model

	Learning environment 1 (Belgium)	**Learning environment 2** (South Africa)
Number of items	16	16
Number of factors	4	4
RMSEA	0.068	0.061
CFI	0.951	0.953
Low item loadings	Item 10 = 0.254	/
Correlations:		
Rich and varied lessons ~ Learning gains	0.941	0.959

In both contexts, the adjustments produced a 4-factor model with adequate fit. Bollen (1989) suggests a value of less than 0.08 for the Root Mean Square Error of Approximation (RMSEA), while Hooper, Coughlan and Mullen (2008) state that a cut-off value close to 0.06 or a stringent upper limit of 0.07 seems to be the general consensus. As far as the Comparative Fit Index (CFI) is concerned, values between 0.0 and 1.0, with values closer to 1.0, indicate a good fit. Hooper et al. (2008) state that a value of CFI $\geq$ 0.95 is recognized as indicative of a good fit. Based on these indices, the model shows adequate fit for both learning contexts.

As shown in the table 4, high correlations between the factor 'rich and varied lessons' and the factor 'learning quality' (0.941 and 0.959) were observed. Despite these high correlations, a three factor solution merging these factors did not result in a better model fit.

Analysis of open-ended questions

The open-ended questions at the end of the questionnaire were analyzed using NVivo software. All answers were captured in the program and coded through a coding scheme informed by literature (theory driven) and subsequently expanded, based on the answers (data driven). The following table (Table 5) offers an overview of the codes. Data driven codes are marked in italics.

Table 5 Coding scheme applied to the responses to the open-ended questions

Codes	Subcategories
Advantages	
- Rich and varied lessons	- *Different perspectives* - *More variation* - *More interaction*
- Increased support	
- Learning gains	
- *Other advantages*	
Disadvantages	
- Confusion	- *Distraction, less concentration* - *Different teaching style* - *Lack of clarity of responsibilities* - *Lack of structure*
- *Less personal relationship*	
- *Inefficiency*	
- *Mismatch with the preferred teaching style*	
- *Decreased well-being*	
- *Other disadvantages*	

Results

Table 6 shows the results of the Confirmatory Factor Analysis (CFA) and the factor loadings of the items in both contexts. Further, it shows the Cronbach's alpha of each factor.

Table 6 CFA results and item loadings

	Learning environment 1 (Belgium)	**Learning environment 2** (South Africa)
Factor 1 – Rich and varied lessons	(α = .625)	(α = .897)
3. the course was/the lectures were more interesting.	.62	.81
4. the atmosphere in the classroom was more relaxed.	.58	.72
5. it was easier for me to concentrate.	.69	.79
12. I paid more attention during the course/lecture.	.80	.74
15. lessons were more varied.	.68	.62
16. I was less distracted.	.72	.74
18. the quality of the lessons improved.	.73	.79
Factor 2 – Increased support	(α = .580)	(α = .771)
1. I dared to ask questions more quickly.	.59	.57
6. I received more (individual) attention.	.75	.76
7. I received support faster.	.71	.86
10. it was noticed more quickly that I did not understand something.	.25	.57
Factor 3 – Learning gains	(α = .738)	(α = .797)
9. I understood the course contents more quickly.	.76	.82
14. I remembered more from the lesson/lecture.	.77	.81
Factor 4 – Confusion	(α = .658)	(α = .753)
2. it was more difficult for me to pay attention.	.58	.80
8. I sometimes missed some structure in the lesson/lecture.	.71	.69

11. time was unnecessarily lost.	.52	.61

In both learning environments, the item loadings on the factors were clear. As previously mentioned, item 10, "it was noticed more quickly that I did not understand something", shows a low loading for the factor 'increased support' in the Belgian data. Nevertheless the fit indices of the model did not improve when removing this item. The item was kept retained in the questionnaire, given the adequate item loading in the South African data. Table 6 shows that the questionnaire resulted in four factors, comprised of 16 items in total. The first factor, 'rich and varied lessons', comprises of seven items, while the other factors are comprised of two to four items. Given that the advantage of 'rich and varied lessons' is most reported in the literature, this is not of concern. Initially, factor 4 ('confusion') comprised of 5 items, but the results of the CFA suggested item loadings for items 13 and 17 that were too low, and resulted in their omission from the final questionnaire.

In terms of reliability, the factors show sufficient to good overall internal consistency (George and Mallery 2003; Field 2013). The reliability coefficients of the factors in the South African data range from good (>.750) to almost excellent (>.900). The coefficients in the Belgian data are less positive, with a rather poor but acceptable Cronbach's alpha (>.500) for factor 2 ('increased support').

The responses to the open question 'Would you like to be taught in this way (team taught) in the future?' suggested that the learners were (very) positive about team teaching. 79.7% of the learners answered the question positively, while 17.1% adopted a more negative attitude and 3.1% were neutral: '*I am very neutral about this way of being taught.*' (L64). '*To me it doesn't matter. The number of teachers doesn't make a difference of how much I understand.'* (L76).

Next, the learners were asked to give at least one advantage and one disadvantage of team teaching. A total of 929 responses were received. Table 7 provides an overview of the main categories (advantages and disadvantages) and their subcategories (themes), and an indication of the importance of each advantage and disadvantage based on the number of learners mentioning an advantage or disadvantage.

Table 7 Advantages and disadvantages of team teaching named by the learners (n = 929)

Advantages (n=633)	**Subcategories**
- Rich and varied lessons (n=443)	- Different perspectives (n=313) - More variation (n=62) - More interaction (n=28) - Without further specification (n=40)
- Increased support (n=122)	
- Learning gains (n=22)	
- Other advantages (n=43)	
Disadvantages (n=296)	**Subcategories**
- Confusion (n=206)	- Different teaching styles (n = 67) - Distraction, less concentration (n=56) - Lack of structure (n=10) - Lack of clarity of responsibilities (n=7) - Without further specification (n=66)
- Inefficiency (n=35)	
- Decreased well-being (n=16)	
- Mismatch with the preferred teaching style (n=9)	
- Less personal relationship (n=8)	
- Other disadvantages (n=22)	

Learners mentioned more than twice as many advantages than disadvantages. Based on Table 7 the learners' responses appear to confirm the literature and expanded on them. The main advantages and disadvantage identified in literature ('rich and varied lessons'; 'increased support'; 'learning gains and confusion') are mentioned by most of the learners in their perception of team teaching. The advantage, 'rich and varied lessons' is the advantage most often perceived by the learners in team teaching. Almost all of the students mention it explicitly. The learners value the different perspectives on the learning contents and the different teaching methods applied: "*Different perspectives equals to better understanding."* (L232); "*It gives multiple insights into the same topic, better understanding through different ways of*

explaining." (L12). Further, the learners appreciate the variation created as a consequence of team teaching: "*I don't get tired so fast because there are two.*" (L41); "*It is less monotonous*." (L301) and that team teaching results in more interaction between the teacher(s) and the learners: "*There was more teacher-learner interaction."* (L301).

Although to a lesser extent, learners also recognize the advantage of 'increased support' during team taught lessons: "*I could be helped quicker."* (L310); "*If you don't understand, one teacher can help you without disrupting the class*." (L50). A small group of learners mentioned perceived greater learning gains as a consequence team teaching: "*For me, it was much more beneficial*." (L220); "*I think it is more effective*". (L309). Other advantages were mentioned as well but could not be categorized in broader categories e.g. "*I like it because I can choose who to consult with.*" (L37). "*As a student you can clearly see the experience and the knowledge of each teacher.*" (L69).

Based on Table 7, 'confusion' is the **disadvantage** most often perceived by learners. Many learners simply stated that team teaching confuses them, without expanding thereon (e.g. "*Sometimes confusing."* (L2); "*Tends to get confusing."* (L324)). Nevertheless, confusion can be caused by various elements of the teaching format. Most of the learners report the 'difference in teaching styles' as confusing: "*You get used to one way of being taught and then have to adjust to another teaching style*." (L232); "*It gets confusing as each teacher has a different approach*."(L312).

A second group of learners attribute confusion to 'distraction' or to not being able to concentrate: "*It's distracting when they walk around while switching*." (L28); "*I sometimes concentrate on what the one is doing who isn't teaching*." (L52). A smaller group of learners think that confusion is due to a 'lack of structure': "*There is less structure, which confuses me*. (196)"; "*The structure of the topic could at times be lost*." (L266); or lack of clarity of

responsibilities: "*Not always sure on who is leading the class*." (L209); "*Sometimes they don't agree and you don't know who is right.*" (L54).

Next to 'confusion', a (small) group of learners perceive team taught classes as 'less efficient': "*At times it is counterproductive*." (L276); "*Sometimes repetition costs time*. (L95). Another small group of learners experienced a decreased sense of well-being: "*I feel like the other teacher sits there to judge us.*" (L346); "*It is slightly intimidating*." (L123). They sometimes regret a less personal relationship with the teacher: "*I feel the relationship is not that personal*." (L23); "*It takes away from the familiarity/relationship that is built between the teacher and the student.* (L46)". A small number of learners say that they prefer individual teaching, above team teaching which causes a mismatch with their preferred teaching style: "*I prefer to have one teacher*." (L181); "*I just don't like it*." (L172).

The advantages and disadvantages mentioned by the learners do not only confirm the findings of the literature; they also corroborate the advantages and disadvantage used as underlying themes for the development of the questionnaire ('rich and varied lessons', 'increased support', 'learning gains, confusion'). They also support the choice of including more items for the factor 'rich and varied lessons' in the questionnaire. 47.6% (n=443) of the advantages mentioned by the learners refer to this factor. These qualitative data also support the inclusion of less items for 'increased support' and the least for 'learning gains'. The questionnaire includes three items for the disadvantage 'confusion'. Given the learners' answers, the number of items for this theme may be increased. Future research may consider including (a limited number) of items for the disadvantage 'inefficiency'. In the current version of the questionnaire, this aspect was included in the factor 'confusion', but the qualitative data suggest that future research may explore this factor as a separate theme.

Conclusions and recommendations for future research

Team teaching offers teacher possibilities for enhancing the learning environment to achieve better learning outcomes through collaboration, sharing expertise, enhancing their own competencies and responding better to learners' needs. In deciding to adopt team teaching or when monitoring team teaching in a particular learning environment, teachers and policy makers search for tools offering valuable insights to support their decision making. The present study investigated the development and validation of an easy-to-use questionnaire. To inform the decision by teachers and policy makers, which has energy, finance and infrastructure implications, to transition to team teaching, the questionnaire allows these stakeholders to assess the advantages and disadvantages of team taught learning environments from the perspective of learners. The questionnaire makes it possible to evaluate whether team taught lessons are an added value from the perspective of the learners. The questionnaire may also be useful in the context of quality assurance processes and may prove helpful to optimize team taught lessons. An alternative to a questionnaire could, for example, be a focus group, although this method of data collection would exclude many learners' perceptions, hence choosing a questionnaire to efficiently gather the perceptions of all the learners.The questionnaire was developed and validated in four stages. During stage one through three, an extensive literature review was carried out and a preliminary version of the questionnaire was developed and piloted by several respondents (learners and teacher educators). In the fourth stage, the questionnaire was validated by two samples of learners in two different learning environments (secondary and higher education), in two different countries (Belgium and South-Africa) and in different subjects. The results of both respondent groups suggested that one global model could be applied. The theoretical model, based on the four underlying themes identified in the literature ('rich and varied lessons', 'increased support', 'learning gains' and 'confusion') could be applied to the datasets of both learning environments and showed adequate fit indices.

The final questionnaire comprises of 16 items and four factors and appears to be valid and generalizable, internally consistent and reliable. The responses to the open questions that were included at the end of the questionnaire confirmed the four underlying themes. They also supported that the factor i.e. 'rich and varied lessons' comprised of more items than the other factors. Further, the qualitative data suggest the possible inclusion of some additional items in the disadvantage 'inefficiency'.

Notwithstanding this result, the present study has some limitations. First, the number of respondents in stages two (eight teacher educators and fourteen student teachers) and three (two high school students) of the development of the questionnaire was rather limited, although adequate. A larger group of respondents may have strengthened the development of the initial items.

Second, the number of learners in the validation learning environments (229 in learning environment 1; 350 in learning environment 2) as well as the number of team taught lessons (4 in learning environment 1; 38 in learning environment 2) were different and, consequently, the design was unbalanced. Third, although the initial aim of the study was to develop an easy-to-use instrument without limitations as far as the target learner population is concerned, the choice of the test populations was rather arbitrary. Fourth, in both learning environments, the learners experienced team taught lessons, but the models applied were not the same (in learning environment 1: equal status model; in learning environment 2: teaming model). Replicating this study with a balanced design and including other models of team teaching (for instance the observation model, coaching model and/or assistant teaching model) would strengthen the results. The aim of the study was the development of a questionnaire which can be applied in various learning settings. In the current study, we investigated the perceptions of learners on team taught lessons applied in secondary and in higher education. Therefore, future research is encouraged to apply the same CFA on datasets of other educational settings (e.g. primary

education, adult education, special education) to further verify the validity and reliability of the questionnaire.

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