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## An international study on teachers' conceptions of learning and teaching and corresponding teacher profiles

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### ABSTRACT

**Introduction:** Teachers' conceptions of learning and teaching (COLT) affect their teaching behaviour. The 18 item COLT instrument has been developed in the Netherlands and comprises three scales, 'teacher centredness', 'appreciation of active learning' and 'orientation to professional practice'. Previously we found five teacher profiles. The aim of this study was to find out if the COLT instrument can be used in an international setting.

**Methods:** Data were collected with the web-based COLT. Cronbach's alphas of the three COLT scales were calculated. Subsequently a cluster analysis was conducted to identify different teacher profiles, followed by a split half validation procedure.

**Results:** Respondents ( $n=708$ ) worked in 28 countries. Cronbach's alphas were 0.67, 0.54, and 0.66. A six-cluster solution fitted best, based on meaning and explained variance. The sixth teacher profile scored high on 'teacher centredness', average on 'appreciation of active learning' and low on 'orientation to professional practice'. The split half validation resulted in a Cohen's kappa of 0.744.

**Discussion:** Cronbach's alphas indicated acceptable reliabilities for all three subscales. The new, sixth profile was labelled 'neo-transmitter'.

**Conclusion:** We found evidence supporting the validity of the use of COLT in an international context and identified a new, sixth teacher profile.

### KEYWORDS

Teaching and learning; staff development; general



## Introduction

Teachers' conceptions of learning and teaching are partly unconscious thoughts about learning and teaching (Kagan 1992; Pratt 1992; Jacobs et al. 2012). Previously, we have developed and validated the measurement of teachers' conceptions of learning and teaching, in student-centred curricula in the Netherlands using an 18-item questionnaire, the COLT (Jacobs et al. 2012). Teachers' conceptions of learning and teaching are affected by personal and contextual factors (Jacobs et al. 2014, 2016). As teachers' personal and contextual factors differ across nations (e.g. Kwan 2019), we hypothesize that teachers' conceptions of learning and teaching also differ across nations. For this, it would be useful to have a tool which can measure these conceptions in a valid and reliable manner in an international context. The measurement of these conceptions using the COLT has already been validated in the Netherlands. Therefore, validation of this measurement internationally would serve comparison across different countries. The aim of this study was, therefore, to determine if these conceptions can be validly and reliably measured using the COLT in an international context.

### Practice points

- Teachers' conceptions of learning and teaching are outcome measurements of faculty development activities.
- The COLT (Conceptions of Learning and Teaching) instrument measures teachers' conceptions in an international context as well.
- In this international study we found an additional new sixth teacher profile, which we labelled as "neo-transmitters".
- The COLT was used in a variety of curriculum types and cultural contexts.

Academic vitality depends upon faculty members' interest and expertise. Faculty development is, therefore, pivotal in promoting academic excellence and innovation (Wilkerson and Irby 1998). Research in faculty development has provided several guidelines for design, implementation, and quality assurance of its initiatives (Steinert et al. 2006,

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**Table 1.** Five teacher profiles based on their conceptions of learning and teaching.

Profile	COLT Scales			Description
	Teacher centredness	Appreciation of active learning	Orientation to professional practice	
Transmitter	++	-	--	Teacher prefers to transmit expert knowledge to students
Organizer	+	-	=	Transmits expert knowledge, in a way with more active involvement than transmitters and helps learners to organize this knowledge
Intermediate	+	+	+	Intermediate profile, depending on the context these teachers can combine transmitter characteristics with CCA characteristics
Facilitator	-	=	--	Facilitates learners to learn, helps to apply and to engage them into deep learning strategies
Conceptual change agent	--	+	+	Aims to stimulate and engage students in deep learning activities, by (re)constructing knowledge and conceptual concepts

The scores on the three scales are represented. For ease of interpretation we used ++ (much higher mean score than overall mean of total group) + (higher mean score), -- (much lower mean score), or - (lower mean score), and = signs (a score almost equal to the overall mean scores).

2016; O'Sullivan and Irby 2011). One of the outcomes of faculty development activities is teachers' conceptions of learning and teaching (Jacobs et al. 2012; Steinert et al. 2016). Conceptions are different from teaching beliefs, which are more deeply rooted and less amenable to change (Kagan 1992; Pratt 1992).

The COLT, which measures conceptions, consists of three subscales: 'teacher centredness', 'appreciation of active learning', and 'orientation to professional practice'. Using the COLT, we have found five teacher profiles, based on their conceptions of learning and teaching, in a previous study (Jacobs et al. 2014). The profiles were named transmitters, organizers, intermediates, facilitators, and conceptual change agents (see Table 1).

If teachers describe their teaching as transmitting knowledge, their students often report a surface learning approach, instead of deep learning (Prosser and Trigwell 1993). On the contrary, teachers aiming to stimulate deep learning in their students, often focus on active knowledge construction by their students and aim at a conceptual change in students. Metaphorically teachers preferring to transmit their knowledge are 'the sage on the stage', and teachers aiming at a conceptual change are 'the guide by your (students') side' (Bulik and Shokar 2007). These relatively modern conceptions of learning and teaching are reflected in the 'conceptual change agent' teacher profile.

There are several personal and contextual factors which affect teachers' conceptions of learning and teaching (Jacobs et al. 2014, 2016). Important contextual factors are medical school and curriculum, as well as support by an educational department, management and finances. Other contextual factors are leadership styles of heads of departments, affordances, support, relatedness, and students' characteristics. Personal factors are agency, experience with PBL (as student or as teacher), personal development, motivation, work engagement and content expertise.

In order to enable comparison of conceptions and their outcomes across contexts, our research question for the present study was: Can the COLT instrument be used for measuring teachers' conceptions of learning and teaching in an international setting? A secondary research question was: Can we replicate the five teacher profiles based on teachers' conceptions in an international setting?

## Methods

We explored teachers' conceptions of learning and teaching in an international setting, using the web-based COLT instrument. Further, we assessed teacher profiles based on these conceptions.

### Instrument

The 18-item COLT (Conceptions of Learning and Teaching) questionnaire was constructed and validated for measurement in the Dutch setting in 2012. Since September 2014, it is freely available at <http://colt.vumc.nl> (Jacobs et al. 2012). It comprises three scales: 'teacher centredness', 'appreciation of active learning' and 'orientation to professional practice'. The web-based COLT consists of five items collecting descriptives and 18 items on conceptions of learning and teaching (on a 5 point Likert scale: 1 = strongly disagree, 5 = strongly agree). After filling out the questionnaire, participants received instant feedback about their conceptions of learning and teaching and corresponding teaching profile.

### Participants

We used three approaches to invite a large group of medical teachers and educators to fill out the COLT. These were: (1) presentations at international medical education conferences, (2) a snowballing strategy by personally inviting several medical education leaders with a MHPE and/or PhD degree in health care education, and (3) our (open source) publications about the COLT.

### Data analysis

Primary dependent variables were the COLT scores on the three respective scales. Secondary dependent variables were the five teacher profiles, derived from the scores on the three COLT scales. With a two-step clustering approach the teacher profiles were created. In the first step we assessed the number of clusters, using Ward's method (Ward 1963; Morey et al. 1983). An analysis of variance was conducted and explained variances of the three scales (teacher centredness, appreciation of active learning, and

**Table 2.** Descriptives.

Characteristics				
Gender: 'You are ...'	Male	Female	Missing	N
	297 (41.9%)	411 (58.1%)	0	708
'What is your age?(yrs)	Mean	Minimum	Maximum	
	42.7 (SD = 11.5)	20.0	74.0	2
Teaching experience	<5 years	5–10 years	>10 years	0
	274 (38.7%)	172 (24.3%)	262 (37.0%)	708
Hours in teaching (weekly)	Mean	Minimum	Maximum	
	7.3 (SD = 7.2)	0	60	19
Organization	University:	Non-University, other health care professionals:	Unknown organization:	
	591 (83.5%)	113 (15.9%)	2 (0.3%)	708

The characteristics of the participants ( $N = 708$ ) including labels of the categories, numbers, means, percentages, standard deviations and missings.

**Table 3.** Overview of participants and their institutional countries.

Continent	Institutional country	Frequency	Percentage
Europe	Belgium	1	0.1
	Danmark	1	0.1
	Germany	2	0.3
	Greece	2	0.3
	Norway	8	1.1
	Portugal	3	0.4
	Sweden	8	1.1
	Switzerland	48	6.8
	United Kingdom	9	1.3
	The Netherlands	436	61.6
North America	Canada	4	0.6
	United States of America	71	10.0
South America	Argentina	1	0.1
	Brazil	25	3.5
	Peru	1	0.1
Australia	Australia	44	6.2
	New Zealand	1	0.1
Asia	China	1	0.1
	Hong Kong	1	0.1
	Indonesia	3	0.4
	Philippines	1	0.1
	Malaysia	2	0.3
	Singapore	2	0.3
Middle East	Israel	20	2.8
	Qatar	1	0.1
	Saudi Arabia	6	0.8
Africa	South Africa	2	0.3
	Zambia	1	0.1
Unknown		3	0.4

orientation to professional practice) were determined. In the second step, we conducted a K-means cluster analysis using z-scores of total scores on the COLT-items. Subsequently, the interpretation of the results of the cluster analysis determined the best fit. Afterwards, a random split half validation procedure was performed to confirm the stability of the clusters.

### Ethical approval

Participants were explicitly asked if they agreed that their results would be used in an anonymized form for research purposes. An information letter and an explanation on informed consent were available on the website. Filling out the complete questionnaire was seen as an informed consent to participate. Ethical approval was provided by the Ethical Review Board of the Netherlands Association for Medical Education (NVMO ref. no. 330).

### Results

The data analysed in this study were collected from July 2014 to September 2017. Participants ( $n = 708$ ) hailed from 32 countries and worked in institutes spread over 28 countries (see Tables 2 and 3). Among the participants were 297

(41.9%) males and 411 females (58.1%). Their mean age was 42.7 years (SD 11.5) with a range of 20–74 years. With respect to teaching experience 274 (38.7%) respondents indicated to have less than 5 years' experience, 172 (24.3%) indicated to have five until 10 years' teaching experience, and 262 (37.0%) indicated to have more than 10 years teaching experience. The (estimated) mean number of hours a week dedicated to face to face teaching was 7.3 hours, with a standard deviation of 7.2 hours and a range from 0 to 60. Further, 591 (83.5%) respondents were affiliated to a university, 113 (15.9%) worked outside a university e.g. working in a non-academic hospital or involved in nursing, and the affiliation of two (0.3%) respondents was unknown.

Cronbach's alphas of the three COLT scales, 'teacher centredness', 'appreciation of active learning' and 'orientation to professional practice' were 0.67, 0.54, and 0.66 respectively. Since cluster analysis is sensitive to outliers, we excluded fourteen outliers from the analysis. Subsequently, the explained variances were determined. A six cluster solution resulted in an explained variance of 71% for the COLT scale 'teacher centredness', 51% for 'appreciation of active learning' and 60% for 'orientation to professional practice'. A five cluster solution in respectively 71, 38, and 60% explained variances. Afterwards, a K-means cluster analysis was conducted and the meaning of both cluster solutions was assessed. The sixth cluster solution fitted best. The new sixth teacher profile, which we labelled 'neo-transmitter', combines a high score on 'teacher centredness' with an average score on 'appreciation of active learning', and a low score on 'orientation to professional practice' (Table 4).

A split half validation confirmed the stability of the six-cluster solution ( $\kappa = 0.744$ ).

### Discussion

In this study, we investigated if Conceptions Of Learning and Teaching can be measured in an international setting using the COLT. Data was collected from a large group of teachers internationally, using the web-based version of the COLT questionnaire. This resulted in acceptable Cronbach's alphas for the three COLT scales. The explained variances of the three COLT scales were also acceptable for the six cluster solution. Based on the interpretation we chose the six cluster solution, indicating that six teacher profiles are seen internationally. The sixth and new profile 'neo-transmitter' combines high scores on the scale 'teacher centredness' with average scores on the scale

**Table 4.** Overview of six teacher profiles in international study.

	N (percentage)	Teacher centredness	Appreciation of active learning	Orientation to professional practice
Transmitters	97 (14.0)	1.29 (++)	-0.22 (-)	0.45 (+)
Neo-transmitters	117 (17.0)	0.57 (+)	-0.11 (=/-)	-0.79 (-)
Organizers	73 (10.5)	0.48 (+)	-1.50 (--)	-0.51 (-)
Intermediates	177 (25.5)	0.11 (=/+)	0.69 (+)	0.69 (+)
Facilitators	112 (16.0)	-0.77 (-)	-0.22 (-)	-0.49 (-)
Conceptual change agents	118 (17.0)	-1.33 (--)	0.74 (+)	0.61 (+)

The six teacher profiles are presented, with horizontally the z-scores for each COLT-scale (teacher centredness, appreciation of active learning and orientation to professional practice). As in Table 1, we provide for ease of interpretation, plus (+ or ++), minus (- or -) and (=) signs, indicating that the mean score is higher (or lower or almost equal) than the overall mean score of all teachers on that scale. The teacher profiles are ordered based on their z-scores on the scale teacher centredness.

'appreciation of active learning'. Cohen's kappa of the split half validation might be interpreted as substantial.

There are several explanations for our findings. Firstly, in this international sample our respondents were either educated or currently working in a diversity of curriculum types. These curriculum types varied from integrated undergraduate curricula, student-centred curricula, problem-based learning, team-based learning, more traditional lecture-based curricula, to competency-based curricula. Because curriculum type is an important predictor of teachers' conceptions of learning and teaching (Jacobs et al. 2014, 2016), it seems logical that we found a new sixth teacher profile in this international study. Secondly, the large number of respondents in this study possibly reflects a further refinement of teacher profiles. Thirdly, the timing of the data collection (July 2014–September 2017) as compared to the COLT development study (November 2009–April 2010) might have resulted in a refinement of teacher profiles. Teachers are now more acquainted with active learning strategies, informed by medical education research and faculty development initiatives.

### Strengths and limitations

A strength of this study is the large international sample of respondents which reflects the dissemination of our research projects. Another strength is that our results underline the relations between teachers, personal and contextual factors, international differences, faculty development and curriculum types. Some limitations are related to our choice of a freely accessible web-based instrument for data collection. Respondents may not be representative for all teachers in their medical school or in their country. Further, we collected limited background information about the respondents due to ethical considerations. However, the most important characteristics associated with teachers' conceptions were included (Jacobs et al. 2015, 2016). In spite of these limitations, we believe that our paper adds to the literature on this topic.

### Suggestions for further research

Firstly, we advocate a follow-up study with individual interviews in some countries with a relatively high number of respondents (e.g. Brazil, Australia, Switzerland, the Netherlands, Israel, UK, Canada) to explore teachers' conceptions of learning and teaching, teacher profiles and international differences in-depth. Secondly, we agree with Lewis and Steinert (2019) and recommend further research on faculty development and cultural contexts in order to

'acknowledge the importance of national norms, values, beliefs, and practices'. To describe cultural contexts, we suggest the dimensions of culture described by Hofstede (2001) which are power distance, individualism/collectivism, masculinity/femininity, and uncertainty avoidance. We recommend further research on the implications of cultural contexts on teachers' conceptions of learning and teaching and professional identity formation.

### Conclusion

We found evidence of validity for the use of COLT questionnaire in an international context. An additional new sixth teacher profile, which we labelled as 'neo-transmitters', was found in this international context.

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### Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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