

Onderwijsaanpak: docentprofielen in het hoger onderwijs

Paper te presenteren op ORD 2012, Wageningen

Ann Stes*

Christel Verdurmen

Peter Van Petegem

Universiteit Antwerpen

* corresponderende auteur:

Ann Stes, Universiteit Antwerpen, Instituut voor Onderwijs- en Informatiewetenschappen,
ExpertiseCentrum Hoger Onderwijs (ECHO), Venusstraat 35, BE-2000 Antwerpen.

E-mail: ann.stes@ua.ac.be

Niet citeren zonder toestemming van de auteurs

SAMENVATTING

Inleiding, probleemstelling en doel

Een belangrijke bijdrage in onderzoek naar de onderwijsaanpak van docenten hoger onderwijs vormt de ontwikkeling van de Approaches to Teaching Inventory (ATI; Prosser & Trigwell, 1999). Daarin wordt onderscheid gemaakt tussen een studentcentrale onderwijsaanpak gericht op inzichtontwikkeling en een docentcentrale aanpak gericht op informatieoverdracht. Kwalitatief onderzoek (Trigwell, Prosser, & Taylor, 1994; Postareff et al., 2008) bracht echter aan het licht dat de onderwijsaanpak van docenten verder gedifferentieerd kan worden dan volgens een globale tweedeling. Aangezien de ATI eenvoudiger in te zetten is in grootschalig onderzoek dan de afname van diepte-interviews, beoogt huidige studie na te gaan of op basis van ATI-scores ook meer specifieke docentprofielen kunnen worden onderscheiden en zo ja, welke. Meyer en Eley (2006) stelden dat de twee soorten onderwijsaanpak zoals onderscheiden door Prosser en Trigwell (1999) de twee polen van een continuüm vormen eerder dan afzonderlijke categorieën. We willen dan ook nagaan of we meer dan twee docentprofielen kunnen vinden op basis van de ATI-scores van docenten.

Onderzoeksmethode

Onderzoekseenheden en procedure dataverzameling

Een vragenlijst werd vrijwillig voorgelegd aan alle docenten van de Universiteit Antwerpen en drie Antwerpse hogescholen (n= 1855). 377 docenten retourneerden een volledig ingevulde vragenlijst (respons= 20%). 30 van hen participeerden in een ruimer onderzoeksproject. Van hen werden interviews afgenomen en zijn zowel kwantitatieve als kwalitatieve data beschikbaar.

Meetinstrumenten

Een Nederlandstalige versie van de ATI werd voorgelegd aan de docenten. Deze versie bleek valide en betrouwbaar; behalve twee hoofdfactoren worden ook vijf sub-factoren onderscheiden (Stes, De Maeyer, & Van Petegem, 2010). De drie sub-factoren Inzichtontwikkeling, Discussie docent-student en Discussie studenten behoren tot de hoofdfactor Studentcentrale aanpak gericht op inzichtontwikkeling; de twee andere sub-factoren Informatieoverdracht en Toetsgerichtheid behoren tot de hoofdfactor Docentcentrale aanpak gericht op informatieoverdracht.

Kwalitatieve data werden verzameld via semigestructureerde interviews; voor deze interviews werd een leidraad ontwikkeld uitgaande van literatuur aangaande onderwijsaanpak (i.c. Prosser & Trigwell, 1999; Trigwell & Prosser, 2004).

Data-analyse

Een clusteranalyse werd toegepast op de ATI-data uitgaande van de vijf sub-factoren in de vragenlijst. Via ANOVA werd nagegaan of de clusters van elkaar verschillen voor wat betreft deze sub-factoren. Chi-kwadraat toetsen gingen de verschillen na tussen de profielgroepen betreffende geslacht, discipline en type onderwijsinstelling.

Uitgaande van een semigestructureerd codeerschema - ontwikkeld uitgaande van de literatuur die aan de grondslag lag van de interviewleidraad, en verder aangevuld tijdens het codeerproces - werden de interviewdata geanalyseerd. De analyseresultaten van twee onafhankelijke onderzoekers werden vergeleken en verschillen bediscussieerd zodat alle data eenduidig konden worden gecodeerd.

Resultaten

Op basis van de clusteranalyse van de ATI-data worden vier docentprofielen van onderwijsaanpak onderscheiden. De ANOVA resultaten laten zien dat de groepen van elkaar verschillen wat betreft de sub-factor Discussie docent-studenten. Ook voor de andere sub-factoren zijn de verschillen tussen de meeste groepen significant. De groepen kenmerken zich als volgt: A) Studentgecentreerde onderwijsaanpak gericht op inzichtontwikkeling zowel als informatieoverdracht; B) Docentgecentreerde onderwijsaanpak gericht op informatieoverdracht; C) Studentgecentreerde onderwijsaanpak gericht op inzichtontwikkeling; D) Docentgecentreerde onderwijsaanpak gericht op inzichtontwikkeling zowel als informatieoverdracht.

De interviewresultaten ondersteunen de indeling in vier profielgroepen. De onderscheidende groepskenmerken vinden we terug in de interviewextracten.

De profielgroepen verschillen van elkaar betreffende geslacht en discipline, niet betreffende type onderwijsinstelling (universitair versus niet-universitair). Docenten uit groep B zijn vaker man en behoren vaker tot de bètawetenschappen; docenten uit groep C zijn vaker vrouw en behoren vaker tot de geestes- of gedragswetenschappen.

Conclusie en discussie

Het is mogelijk om op basis van de ATI-scores meer specifieke docentprofielen te onderscheiden dan de vaak gehanteerde tweedeling. Vier docentprofielen worden onderscheiden. Bij twee ervan is er een dubbele onderwijsintentie. Deze bevinding is conform onderzoek van Postareff e.a. (2008), die tevens 'dissonante' profielen terugvonden.

Het onderscheid dat gemaakt wordt via de vaak gehanteerde tweedeling in onderwijsaanpak blijkt relevant. Anderzijds werden in onze studie twee bijkomende profielgroepen onderscheiden. Rekening houdend met de mate waarin interactie wordt nagestreefd, kunnen de groepen op een continuum worden geplaatst met de twee veelal onderscheiden soorten onderwijsaanpak als uiterste polen: groep B → groep D → groep A → groep C. Dit continuum is gelijkaardig aan datgene dat op basis van kwalitatief onderzoek werd teruggevonden door Trigwell, Prosser en Taylor (1994).

De gevonden verschillen tussen de profielgroepen inzake geslacht en discipline zijn conform eerdere onderzoeksresultaten (e.g. Singer, 1996).

Introduction

Research into Teaching Approaches in Higher Education

Teaching approaches in higher education have already been the subject of a considerable body of research (Biggs 1987; Trigwell, Prosser, and Taylor 1994; Trigwell, Prosser, and Waterhouse 1999). An important contribution to this was made by Prosser and Trigwell (1999). Their Approaches to Teaching Inventory (ATI) categorizes teachers' approaches to teaching into two different types: a conceptual change/student-focused approach (CCSF) and an information transmission/teacher-focused approach (ITTF). The CCSF approach is intended to change students' ways of seeing using a teaching strategy that focuses on the student. In the case of the ITTF approach the intention is to transmit information by using a teacher-focused strategy. Teachers who show student-focused behaviour in their course teaching have a more complete conception of their teaching of that course. A teacher who uses a teacher-focused strategy conceives his or her teaching of that course in a limited way. There is coherence between a teacher's conception of teaching and his or her actual approach or behaviour. Consequently, if a teacher wishes to change his or her teaching behaviour, he or she will need to reconsider his or her conceptions of teaching (Prosser and Trigwell 1999). Later studies (e.g. Gibbs and Coffey 2004; Lindblom-Ylänne, Trigwell, Nevgi, and Ashwin 2006; Nevgi, Postareff, and Lindblom-Ylänne 2004) confirmed the presence of these teaching approaches in a variety of contexts.

Whereas Prosser and Trigwell (1999) categorize approaches to teaching into two different types, a study by Trigwell, Prosser, and Taylor (1994) yielded five qualitatively different approaches to teaching. The first approach they identified is one in which the teacher adopts a teacher-focused strategy with the intention of transmitting information to students. The second approach also consists of a teacher-focused strategy, but with the aim that students should acquire the concepts of the discipline. In a third approach this same intention is also apparent, but the teachers adopt a strategy involving interaction with the students, as they assume students' active engagement is needed in order to accomplish this intention. This focus on what the students are doing is even more apparent in the last two approaches. The teachers use a student-focused strategy in order to help students develop their conceptions (approach four) or change their conceptions (approach five).

A recent study by Postareff et al (2008) revealed six profiles of teaching approaches. Two profiles were termed 'consonant' (specifically, 'consonant content-focused' and 'consonant learning-focused'), as these profiles were characterized by teaching strategies and conceptions of teaching which were all theoretically consistent, with a content- or teacher-focused approach and a learning- or student-focused approach, respectively. The profile 'consonant learning-focused' was further sub-divided into two sub-profiles, namely the 'systematically learning-focused profile' and the 'reflectively learning-focused profile' with the latter group of teachers describing their teaching in a more reflective manner than the former group. Three profiles were termed 'dissonant', as these profiles were characterized by teaching strategies and conceptions of teaching some of which were theoretically inconsistent – in other words, in which teacher- and student-focused conceptions and strategies were combined. In addition to the profile 'systematically dissonant', the profile 'towards learning-focused' was also identified. This profile was further sub-divided into two sub-profiles, namely the 'contextually varying profile' and the 'developing profile' with the second group of teachers clearly developing towards a consonant learning- or student-focused profile, and the first group doing so only in the case of small group sizes, but being unable to do so in the case of bigger group sizes.

Aim of the Present Research

The aim of the present research is to map out the approaches to teaching profiles of teachers in higher education on the basis of their scores on the ATI (Prosser and Trigwell 1999). Qualitative interview data was used to obtain a more detailed picture of the profiles. In the study by Trigwell, Prosser, and Taylor (1994) interviews with 24 teachers were analysed phenomenographically in order to describe the different approaches to teaching first year university science, while Postareff et al (2008) primarily used a qualitative methodology to capture the variation in approaches to teaching. We have used the ATI inventory as a primary source of data, supplemented with qualitative interview data, as the ATI inventory has been proven to be a valid and reliable instrument for ascertaining the approach to teaching of teachers in higher education (Trigwell and Prosser 2004; Prosser and Trigwell 2006; Stes, De Maeyer, and Van Petegem 2010) and, importantly, it is a brief questionnaire which is simple to use. For this reason we anticipate that in the future the ATI is more likely to be the tool of choice for educational research or educational practice where the aim is to ascertain the approach to teaching of teachers in higher education, as against the more time-consuming method of in-depth interviews with teachers as used by Trigwell, Prosser, and Taylor (1994) and Postareff et al (2008).

In order to identify approaches to teaching profiles a person-centred approach is required (Magnusson 1998). The primary aim of person-centred analyses (such as cluster analysis; Gore 2000) is to classify individuals into groups with similar approaches to teaching profiles. This is useful both at the theoretical level and at the practical level.

In the first place, from a theoretical viewpoint, person-centred analyses might provide further evidence for the internal validity of the ATI. If there is any truth to the claim that the qualitative difference between CCSF and ITTF is of critical importance for describing teachers' approach to teaching (Prosser and Trigwell 2006), it is important to be able to show that at least two groups of teachers exist which are characterized by different approaches to teaching profiles. Specifically, we would need to find a CCSF group, characterized by a conceptual change (CC) teaching aim and a student-focused (SF) teaching strategy, as well as an ITTF group, characterized by an information transmission (IT) teaching aim and a teacher-focused (TF) teaching strategy. Meyer and Eley (2006) stated that the two approaches, as distinguished by Prosser and Trigwell (1999), are not separate categories, but rather opposite poles on a single continuum. If it is indeed true that every teacher's teaching profile can be positioned along a continuum with the pole CCSF at one end and ITTF at the other, we would need to be able to find more than two profiles.

Secondly, from a more applied perspective, assigning teachers to particular clusters reflects a particular combination of approaches to teaching scores, which is likely to yield more diagnostic information relative to teachers' scores on the separate dimensions of the ATI, i.e. CCSF and ITTF. Gaining insight into teachers' approaches to teaching profiles is also of practical value because instructional development interventions supporting teachers' development toward CCSF-profiles could then be better tailored to each particular group.

Instruments and Methods

Participants

A questionnaire was offered to all teachers at the University of X and at three university colleges in X on a voluntary basis (N= 1855). In all, 377 teachers returned a fully completed questionnaire (response rate of 20%). Interviews were conducted with a small sample who voluntarily participated in a larger research project. Both questionnaire and interview data were available for 30 academics.

Inventory

The teachers concerned completed a Dutch translation of the ATI (expanded version of 22 items; Trigwell, Prosser, and Ginns 2005). The expanded version of the ATI consists of 22 items, scored on a five-point Likert scale, categorizing teachers according to two different teaching approaches: 'conceptual change/student-focused approach' and 'information transmission/teacher-focused approach'. The conceptual change/student-focused (CCSF) scale describes an approach intended to change students' ways of thinking through a teaching strategy focusing on the student. The information transmission/teacher-focused (ITTF) scale describes an approach intended to transmit information by using a teacher-focused strategy. A study by Stes, De Maeyer, and Van Petegem (2010) confirmed the validity and reliability of the Dutch version. The study revealed the two main dimensions as identified by Prosser and Trigwell (2006) in their two-factor model. However, some of the items belonging to the same dimension were found to be more connected than others. In addition to two main factors, five sub-factors were also found: conceptual change, discussion: teacher-student, discussion: students, information transmission, and test-focus. The first three sub-factors were related to a student-centred approach aimed at conceptual change and the last two related to a teacher-centred approach aimed at information transmission.

Interviews

Qualitative data were gathered by taking semi-structured interviews (Bryman 2004) aimed at ascertaining teachers' self-reported approaches to teaching. An interview schedule was developed with reference to relevant literature about teaching approaches (Prosser and Trigwell 1999; Trigwell and Prosser, 2004). All interviews were transcribed verbatim, leading to transcripts ranging in length from 1,200 to 4,800 words, with an average length of around 2,600 words.

Analyses

A hierarchical cluster analysis was performed on the questionnaire data using the variables 'conceptual change', 'discussion: teacher-student', 'discussion: students', 'information transmission', and 'test-focus' to explore homogeneous clusters of cases within the data. Average linkage within groups and squared Euclidean distance were used to calculate the mean distance between all possible cluster pairs. Average linkage within groups focuses most on homogeneity within clusters, which was considered the most important feature in clustering. Squared Euclidean distance is the default for interval data. The number of clusters was determined by the following requirements: each case had to be included in a cluster, the main clusters needed to include a reasonable number of cases, and there should be an adequate increase in distance. A one-way ANOVA was performed to see whether the clusters differed on the five scales. The η^2 -index for one-way ANOVA was used as an estimate of effect size. Guidelines for the interpretation of the η^2 -index take $\eta^2 = .01$ as a small effect, $\eta^2 = .06$ as a medium effect and $\eta^2 = .14$ as a large effect (Green and Salkind 2003). The Dunnett's C test was used as a post-hoc test to identify which clusters differed on which scales.

To analyse the qualitative interview data, a semi-structured coding framework was developed which served as a conceptual basis from which to start the coding. The framework was worked out with reference to the same literature as used to develop the interview schedule. As coding continued, the framework was further completed. The ATLAS/ti software (Weitzman and Miles 1994) was used to assist in the coding of interview transcripts.

Two researchers coded the data independently. Data which was coded differently was discussed in detail to ensure that all data was finally interpreted and coded in the same way.

Results

Quantitative Clustering

The hierarchical cluster analysis showed four clusters with a meaningful difference. The main properties of these clusters are shown in Table 1. As can be seen, the respondents were fairly equally distributed over the four clusters. Figure 1 is a visual representation of the main differences between the clusters.

(Table 1 & Figure 1 near here)

The ANOVA, evaluating the relationship between belonging to one of the four clusters and the teaching approach aspect 'conceptual change', was significant, $F(3, 373)=79.87, p<.001$. The strength of relationship, as assessed by η^2 , was strong, with belonging to one of the four clusters accounting for 39% of the variance. All clusters differed significantly ($p<.05$) from each other regarding the 'conceptual change' aspect, except clusters A (3.59) and D (3.77).

Regarding the aspect 'discussion: teacher-student' the four clusters also differed significantly: $F(3, 373)=138.23, p<.001; \eta^2 = .53$. Pairwise differences among the means were all significant ($p<.05$).

A strong relationship was also found between 'discussion: students' and belonging to one of the four clusters: $F(3, 373)=220.51, p<.001; \eta^2 = .64$. Only clusters B (1.94) and D (1.89) differed not significantly from each other with regard to this aspect of teaching approach (5% level).

Belonging to one of the four clusters accounted for 41% of the variance of the aspect 'information transmission' ($F(3, 373)=85.68, p<.001$). Clusters A (3.79) and D (3.88) as well as clusters B (3.99) and D (3.88), however, differed not significantly from each other (5% level).

Finally, an ANOVA showed a significant relationship between belonging to one of the four clusters and the 'test-focus' aspect of teaching approach: $F(3, 373)=49.98, p<.001; \eta^2 = .29$. Cluster D (3.67), however, differed not significantly from cluster A (3.89), neither from cluster B (3.76). The last two differed not significantly from each other either.

On the basis of their properties the four clusters can be characterized as follows:

- (1) Student-focused teacher aiming to change students' conceptions as well as to transmit information: moderate intention of changing students' conceptions, high use of teacher-student discussions, moderate use of student discussions, high intention of transmitting information, high focus on the test;
- (2) Teacher-focused teacher primarily aiming to transmit information: low intention of changing students' conceptions, low use of teacher-student discussions, low use of student discussions, high intention of transmitting information, high focus on the test;
- (3) Student-focused teacher primarily aiming to change students' conceptions: high intention of changing students' conceptions, high use of teacher-student discussions, high use of student discussions, low intention of transmitting information, low focus on the test;
- (4) Teacher-focused teacher aiming to change students' conceptions as well as to transmit information: moderate intention of changing students' conceptions, moderate use of teacher-student discussions, low use of student discussions, high intention of transmitting information, high focus on the test.

The qualifications ‘high’ to ‘low’ are not based on the scale average only, but are assigned in relation to the averages of the other clusters.

Qualitative Perspective on Clustering

The combination of quantitative and qualitative data gave us a detailed series of pictures of the four clusters. However, the number of participants interviewed in the four clusters varies. Cluster B is overrepresented in our qualitative analysis; and cluster C is less well represented. This section provides a description of each cluster that includes quotations from interviewees belonging to the cluster concerned in order to clarify the core properties of the cluster. Each interviewee is referred to by a pseudonym in order to preserve anonymity. Table 2 gives an overview of the most important findings of the qualitative study of the clusters.

(Table 2 near here)

A: Student-focused teacher aiming to change students’ conceptions as well as to transmit information (111 respondents including seven interviewees)

More than a quarter of the respondents who completed the Approaches to Teaching Inventory regarded themselves as student-focused teachers aiming to change students’ conceptions as well as to transmit information. They scored high to moderate on the scale ‘Conceptual change’ and high on the scale ‘Information transmission’. Their teaching has two aims: they want to change their students’ conceptions, but at the same time they also place a heavy emphasis on transmitting information, as well. One of the interviewees summarizes what he wants to achieve in the following way:

“I want them to get a feeling for formulas. What I definitely want to avoid is that they get set an exercise; they go and look the formula up in their course book, fill in the parameters and then arrive at the result. That’s not how to do it. They have to get a genuine sense of what a formula actually means. And I put a lot of stress on this... to try to ...to get a visual image across. For example, Coulomb’s law ...those 2 charges... they have to really understand that those two identical charges repel each other and that the repulsion is inversely proportional to the distance between those charges. That is my main concern, actually.” (Johan, teaching physics).

This interview extract clearly shows the aim of changing students’ conceptions. However, in the same interview Johan states that his primary teaching aim is actually the transmission of information.

“So, letting the students take the initiative, discussions, and information transmission are (all three) involved, but not in that order, of course... in fact, to be really honest, the main focus is still one-way: teaching them the theory.” (Johan, teaching physics)

Teachers belonging to this first cluster consider that interaction with their students is important. In addition, they also try to stimulate interaction between students.

“Each lesson can end in a sort of discussion. For example, student x teaches a lesson, in which he or she may use only slides and then everyone has to give positive and negative feedback and sometimes this ends up in discussions, as some people agree or disagree.” (Chris, teaching didactics)

A high focus on the assessment is also typical for teachers of this cluster.

“If you look at the course book, it’s full of derivations, and sometimes they ask: ‘do we have to know these?’ Yeah, well, certainly they need to know these in order to understand things properly. At the end of the day, however, they are not asked for the full derivation in the exam. This is something that I do my best to get across to the students: they don’t really need to study derivations for the exam. They don’t need to have mastered every detail of the course material. They just need to pass the exam, that’s enough actually.” (Sven, teaching mathematics)

B: Teacher-focused teacher primarily aiming to transmit information (89 respondents including eleven interviewees)

Teachers belonging to the second cluster aim to transmit information during teaching. In contrast to teachers in the first cluster, however, they do not aim to change students’ conceptions as well.

“It’s information transmission, and that is also the course objective. It’s an introductory course and the intention is to bring different people who have studied different syllabuses at secondary school up to the same level in terms of their knowledge of computer systems. For some of them this is something new, for others it’s something they’ve done already. But information transmission is what I am trying to achieve.” (Paul, teaching computer sciences)

Interaction with or between students is not stimulated. The focus is on the teacher, not on the students.

“Sometimes there were some questions, but then it was just a question and an answer. We never had an interactive discussion.” (Elke, teaching biochemistry)

As in the case of the teachers belonging to cluster A, teachers in this cluster direct their teaching strongly towards the assessment.

“I always have the exam very present in the back of my mind when I’m teaching. In fact I often give the students two or three examples, so that they have to do some practical exercises. Afterwards I say to them: ‘okay, keep that in mind for the exam’, because I gave them a typical exam question. I also give them a sample exam paper at the end so that they can use it to practice on their own and that is, in fact, completely geared to the actual exam and there are even questions from that sample exam paper that come up in the exam later.” (David, teaching zoology)

C: Student-focused teacher primarily aiming to change students’ conceptions (94 respondents including four interviewees)

A quarter of the teachers who completed the questionnaire regarded themselves as student-focused teachers aiming to change students’ conceptions. In comparison to the teachers belonging to the other three clusters they scored highest on the dimensions conceptual change, discussion: teacher-student, and discussion: students, while lowest on the dimensions information transmission and test-focus.

The teaching aim is definitely not transmitting information. Instead, the stress is on changing students' conceptions so that students become capable of solving (real life) problems:

“The most important thing is that they can work with knowledge: that they understand what it means and that they can then link it to other disciplines. Statistical physics, for example, is often used in other subjects. So if this comes up in other subjects or in problems that they are going to come across later on, they will know how to apply it properly.” (Stefaan, teaching physics)

As in the case of teachers belonging to cluster A, interaction with and between students is considered important, but it goes even further. Teachers in this cluster emphasize that their lessons are a sequence of interactions:

“I've completely dropped the idea of giving them a lecture and so we have done much more work based around subjects where I give a brief explanation and then just sit at the table with them. They get literature assignments which we then discuss. They have to ask the questions themselves, so there is a continuous interaction.” (Margo, teaching biophysics)

“The students actively process the study material during the classes. They also get class time to work on their assignments, that might be individual work or done in pairs, but it is often about groups of 3 to 4 people.” (Marthe, teaching didactics)

Teachers belonging to this third cluster score themselves in the inventory as having a low test-focus. In a certain sense, however, they actually place quite a strong emphasis on the assessment in that this is mixed in with their teaching.

“It's really quite removed from classic teaching. What we do is to hand out recent research papers and the students have to study a topic taken from this literature and put questions to their classmates. They have to submit these in advance. We then award marks for all of this, so that there is no need for any separate testing.” (Jan, teaching biochemistry)

In line with this integration of assessment and instruction, teachers belonging to this cluster typically tend not to organize classic tests, preferring, instead to use alternative forms of assessment such as portfolio assessment, peer assessment, or assessment of a presentation and/or a paper.

“And they hand in the portfolio when they do the exams in January. Actually, I don't set a real exam anymore. So the portfolio in fact constitutes the real basis for the marks I give, together with the impression mark from the continuous evaluation that I make during the class. Part of it also depends on peer assessment, in which they assess each other on the basis of the work they have done as a group.” (Marthe, teaching didactics)

“What their exam really consists of, then, is that they have to choose one topic about which they have to collect different types of literature, including academic articles that they have to read for themselves. They then have to make a complete

interpretation of the subject, give a talk about it and also write an assignment on it.”
(Margo, teaching biophysics)

D: Teacher-focused teacher aiming to change students’ conceptions as well as to transmit information (83 respondents including eight interviewees)

The teachers belonging to this cluster resemble the teachers in cluster A. Firstly, in terms of the aims of their teaching, as in the case of teachers in cluster A, teachers from this group also want to change their students’ conceptions, while at the same time placing a heavy emphasis on transmitting information, as well. A high focus on the assessment is also typical for both cluster groups. However, the teachers belonging to cluster D differ from the teachers in cluster A with respect to the extent of interaction during teaching. Cluster D teachers are more teacher-focused in the sense that interaction with - and especially between - students is a less important element in their teaching.

“Yes, I do my absolute best to explain everything to them, but that might be a bit too much. Maybe I ought to use more interaction with the students. Deep down I know I ought to do that, but that’s not really in my nature.” (Jef, teaching biomedicine)

“I don’t create much interaction between the students. Sure, you can do that, but with such a big group there are limits to what you can do with this. Also, if you want to do this using Blackboard, for example, this involves an awful lot of admin outside your normal teaching and you end up making far too much work for yourself.” (Marijke, teaching government policy and communication)

Further Analyses of Profiles

The four profile groups were further analysed with regard to differences in terms of gender, teaching discipline (i.c. a soft discipline such as history or education, or a hard discipline such as chemistry or medicine; Becher 1994), and type of higher education institute (i.c. university college or university).

As can be seen in Table 3, there were statistical differences in terms of gender between the four profile groups. Teachers belonging to cluster B were more often men than women, while teachers belonging to cluster C were more often women. A chi-square test showed that the differences between the profile groups were statistically significant (chi-square=9.69, $p=.02$). Disciplinary differences were also found. Teachers belonging to cluster B more often represented hard sciences than soft sciences, while teachers belonging to cluster C more often represented soft sciences (chi-square=11.5, $p<.01$). In comparison to their colleagues from the soft disciplines, teachers belonging to hard disciplines seem to be more inclined to focus on themselves while teaching. They also place a greater emphasis on the aim of transmitting information.

The finding that a teacher’s academic discipline influences his or her teaching approach was also explicitly mentioned by the interviewees. This was particularly true of teachers in cluster B, who referred to their discipline in explaining why they taught the way they did. They often mentioned feeling that they had no choice with regard to their teaching approach.

“Actually there’s not much to discuss about, mathematics is mathematics. It is different if you teach a course related to law or politics: this point of view and

that point of view, they are different, and if you consider it this way, but with mathematics, you can't get a word in it. So it depends on the course." (Erwin, teaching mathematics)

No statistical differences in terms of higher education institute (i.e. university college or university) were found between the profile groups.

(Table 3 near here)

Discussion

Earlier research (e.g. Kember and Kwan 2000; Prosser and Trigwell 1999; Åkerlind 2003) has shown that the intention of changing students' conceptions is little compatible with the intention of transmitting information. However, Postareff et al (2008) found that some teachers self-reported both learning- and content-focused approaches to teaching simultaneously, making their profiles dissonant. Our own study is consistent with their results as we found two teaching profiles (profiles A and D) in which both intentions were combined. In line with Postareff et al (2008) we have also called these profiles 'dissonant'. Although Meyer (2000) argues that it is difficult to research dissonance in quantitative terms, our study shows that cluster analysis of quantitative data provides a way of doing so. As in the study of Postareff et al (2008), approximately half the profiles in our study were categorised as dissonant. However, the teachers in our study who have a dissonant teaching profile differ from the teachers belonging to the sub-group 'systematically dissonant profiles' as distinguished by Postareff et al (2008). Whereas in the study of Postareff et al (2008) all teachers with a dissonant teaching profile described their teaching strategies in both teacher- and student- focused terms, in our study it was teachers' teaching intentions that were described as both teacher- and student-focused and not teachers' teaching strategies. The teachers in our study who exhibit teaching profile A cannot be described as having no deep interest in teaching and as not willing to develop themselves as teachers. They are more comparable with the sub-group 'developing profiles' than they are with the sub-group 'systematically dissonant profiles' as described by Postareff et al (2008). Our cluster B is comparable to the 'consonant content-focused' profile sub-group as distinguished by Postareff et al (2008) and our cluster C is close to their sub-group 'consonant learning-focused profile'. A distinction within this sub-group between systematically and reflectively learning-focused was not revealed in our study.

Prosser et al (2003) found that courses given by teachers with a dissonant teaching profile were perceived as worse by students (i.e. poorer teaching, higher workload, less clear goals) than courses given by teachers with a consonant teaching profile. Furthermore, higher quality learning outcomes can be expected from courses in which there is consonance in teachers' approaches to teaching. Consonant teaching profiles were revealed to be related to teachers' perceptions of a positive teaching context (i.e. a feeling of control over teaching, feeling of class size and workload being appropriate, and a feeling of teaching being valued in the department) (Prosser et al. 2003). Whether these relationships can also be found in our research context will be the focus of future research linking teaching profiles with student perceptions of the teaching and learning environment, student learning outcomes, and teaching perceptions of the teaching context.

Given the positive impact of a student-focused teaching approach on the quality of student learning, teachers should be helped to develop an approach of this kind (Postareff et al. 2008). Earlier research (Gibbs and Coffey 2004; Postareff, Lindblom-Ylänne, and Nevgi 2007; Stes, Coertjens, and Van Petegem, 2010) has shown that instructional development can increase the extent to which teachers adopt a student focus. However, an in-depth impact

study by Stes (2008) revealed that instructional development programmes in higher education do not automatically lead to effects on teachers' day-to-day teaching approach. Altering academics' ideas about teaching is not easy (Kember and Gow 1994). Stes (2008) concluded that training programmes should fit in with the actual needs and wishes of the target group in order to enhance their impact. Therefore it might be useful that, at the start of training, participants fill in the ATI in order to get insight into their approaches to teaching profiles. This is less time-consuming than taking in-depth interviews with all participants and—as the current study has shown—nevertheless allows assigning teachers to particular profiles, reflecting a combination of approaches to teaching scores. That way instructional development interventions supporting teachers' development towards CCSF-profiles could be tailored to each particular group. For example, for the teachers in our study belonging to cluster D, it might be especially important to focus during training on the importance of stimulating interaction with and between students, and on how to do so. Teachers with profile C are probably more interested in ways to elaborate a reliable alternative assessment for their students.

As in the case of earlier studies (Meyer and Eley 2006; Postareff and Lindblom-Ylänne 2008; Stes, De Maeyer and Van Petegem 2010), our study reveals that it is important to avoid automatically fitting results obtained with the ATI questionnaire only into the two-factor structure postulated by its authors. In order to get a more detailed picture of the thoughts and actions of an individual teacher, it is useful to search for different approaches to teaching *profiles* as was done in the present study. Our results imply that the qualitative difference between CCSF and ITTF is of importance for describing teachers' approach to teaching. We did indeed find a CCSF group (namely cluster C) characterized by a conceptual change (CC) teaching aim and a student-focused (SF) teaching strategy; together with an ITTF group (namely cluster B) characterized by an information transmission (IT) teaching aim and a teacher-focused (TF) teaching strategy. However, we also found two additional profiles (namely clusters A and D) with characteristics belonging to both clusters B and C. Due to the difference in importance attached to interaction during teaching, cluster A is more congruent with cluster C, while cluster D being more congruent with cluster B. We conclude that our results are in line with the results of Postareff et al (2008) in showing that the CCSF and ITTF approaches are separate categories and have their own special characteristics, but, at the same time, we believe that they can also be seen as poles of a continuum as well. We would position the four clusters distinguished in the present study on that continuum as follows, with cluster B as the most teacher-focused and cluster C the most student-focused:

Cluster B → Cluster D → Cluster A → Cluster C

This continuum is similar to the continuum we can recognize in the five approaches as described by Trigwell, Prosser, and Taylor (1994). The approach to teaching, as found in cluster B of our own study is similar to the first teaching approach as described by Trigwell, Prosser, and Taylor (1994) – in other words, an approach consisting of a teacher-focused strategy with the intention of transmitting information to students. The approach to teaching of teachers belonging to our cluster D is comparable with the second approach in the study of Trigwell, Prosser, and Taylor (1994). It is characterized by a teacher-focused strategy and by the intention of helping students to acquire concepts (Trigwell, Prosser, and Taylor 1994) or to change conceptions (this study). This intention is achieved by means of explaining concepts and their interrelationships to students, while at the same time having the intention of transmitting information. This twofold intention is found in the approach to teaching of teachers belonging to our cluster A as well. This approach is comparable with the third approach identified by Trigwell, Prosser, and Taylor (1994) and is characterized by a strategy involving interaction. The focus is on the students, who are regarded as active partners in the

teaching-learning process. The approach to teaching found in our cluster C is similar to teaching approaches four and five as described by Trigwell, Prosser, and Taylor (1994), in other words an approach consisting of a student-focused strategy aimed at students developing or changing their conceptions.

Based on our continuum, as shown above, we can say that, in general terms, the approach to teaching of teachers belonging to cluster A only differs from the approach of teachers belonging to cluster D with respect to the importance attached to interaction during teaching. Teachers belonging to cluster A stimulate discussions between students to a much greater extent than teachers belonging to cluster D. We can further state that the more we shift to the right-hand end of our continuum, the more interaction (both between the teacher and the students and among the students themselves) is apparent in teachers' teaching approach. Postareff and Lindblom-Ylänne (2008) found interaction in teacher-centred teaching approaches as well as in student-focused approaches, with only the purpose of the interaction being different. However, based on the findings of the present study, the extent to which interaction is stimulated seems to be another area of difference and is therefore an important characteristic of a teacher's teaching approach. The more interaction is stimulated, the more student-centred a teacher's teaching approach is. This is in line with earlier research (e.g. Kember 1997; Samuelowicz and Bain 1992) indicating that the absence or presence of interaction marks the transition from a teacher-centred teaching approach to a student-centred teaching approach. Trigwell and Prosser (1996) found a relationship between a teacher's teaching approach and a particular kind of interaction - specifically, the use of questions (asked by the teachers themselves as well as those asked by students). Teachers adopting a teacher-centred teaching approach saw little or no value in the use of questions during teaching. Teachers who adopt a more student-centred approach saw questions as an integral and important part of their teaching.

Analyses of the four profile groups revealed differences in terms of gender, with teachers belonging to cluster B being more often men than women, and teachers belonging to cluster C being more often women. This finding is in line with previous research (Nevgi, Postareff, and Lindblom-Ylänne 2004; Lacey and Saleh 1998; Singer 1996) showing female faculty members presenting more student-focused approaches to teaching than male teachers. Disciplinary differences were found with teachers belonging to cluster B representing more often hard sciences than soft sciences, and teachers belonging to cluster C representing more often soft sciences. This finding is, likewise, in line with earlier studies (e.g. Lindblom-Ylänne et al. 2006; Lueddeke 2003; Nevgi, Postareff, and Lindblom-Ylänne 2004; Prosser et al. 2003; Singer 1996) revealing that teachers belonging to a hard discipline were less student-focused in their teaching approach than teachers belonging to a soft discipline. No statistical differences in terms of higher education institute (i.e. university college or university) were found between the profile groups. These results suggest again the importance of tailoring instructional development initiatives to the different profile groups. Attention should be paid to the teaching preferences of male versus female teachers and to the particular characteristics of the teaching disciplines.

A limitation of the present study was that the questionnaire was given to teachers on a voluntary basis. This may have meant that it was mainly teachers who show a spontaneous interest in teaching or who are concerned with their approach to teaching, who completed and returned the questionnaire. This may, in turn, have influenced the mean scale scores and the range in which respondents scored. This does not constitute a problem for our present study, however, given that we did not set out to give a representative picture of the approach to teaching of the average teacher in higher education in X. It should also be pointed out that representing such a picture would have been impossible in any case, given that the ATI is a relational inventory: it does not assess general orientations, but rather specific responses to

particular situations (Prosser and Trigwell 2006). Future research should focus on the representativeness of the approaches to teaching profiles in higher education.

We conclude our current study provides further evidence for the ATI being a valid tool to ascertain the approach to teaching of teachers in higher education. Data collected by the ATI can be used to assign teachers to particular clusters reflecting a particular combination of approaches to teaching scores, which yields more diagnostic information relative to teachers' scores on the separate dimensions of the ATI. When used in that way the ATI can be a worthwhile alternative for the more time-consuming method of in-depth interviews with teachers.

References

- Becher, T. 1994. The significance of disciplinary differences. *Studies in Higher Education* 19, no.2: 151-162.
- Biggs, J. 1987. *Student approaches to learning and studying*. Hawthorn: Australian Council for Educational Research.
- Bryman, A. 2004. *Social research methods*. Oxford: University Press.
- Gibbs, G., and Coffey, M. 2004. The impact of training of university teachers on their teaching skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education* 5: 87-100.
- Gore, P.A. Jr. 2000. Cluster analysis. In *Handbook of applied multivariate statistics and mathematical modeling*, ed. H.E.A. Tinsley and S.D. Brown, 297-321. San Diego: Academic Press.
- Green, S.B., and N.J. Salkind. 2003. *Using SPSS for windows and macintosh. Analyzing and understanding data* (third edition). New Jersey: Pearson Education.
- Kember, D., and Gow, L. 1994. Orientations to teaching and their effect on the quality of student learning. *Journal of Higher Education* 65: 58-74.
- Kember, D. 1997. A reconceptualisation of the research into university academics' conceptions of teaching. *Learning and Instruction* 7: 255-275.
- Kember, D., and Gow, L. 1994. Orientations to teaching and their effect on the quality of student learning. *Journal of Higher Education* 65: 58-74.
- Kember, D., and Kwan, K. 2000. Lecturers' approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science* 28: 469-490.
- Lacey, C., and Saleh, A. 1998. Teaching nine to five: A study of the teaching styles of male and female professors. Paper presented at the Women in Educational Leadership Annual Conference, October 11-12.
- Lindblom-Ylänne, S., Trigwell, K., Nevgi, A., and Ashwin, P. 2006. How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education* 31: 285-298
- Lueddeke, G.R. 2003. Professionalizing teaching practice in higher education: a study of disciplinary variation and 'teaching scholarship'. *Studies in Higher Education* 28: 213-228
- Magnusson, D. 1998. The logic and implications of a person-centered approach. In *Methods and models for studying the individual*, ed. R.B. Cairns, L.R. Bergman, and J. Kagan, 33-64. Thousand Oaks, CA: Sage.
- Meyer, J.H.F. 2000. The modeling of 'dissonant' study orchestration in higher education. *European Journal of Psychology of Education* 15: 5-18.
- Meyer, J.H.F., and Eley, M.G. 2006. The approaches to teaching inventory: a critique of its development and applicability. *British Journal of Educational Psychology* 76: 633-649.

- Nevgi, A., Postareff, L., and Lindblom-Ylänne, S. 2004. The effect of discipline on motivational and self-efficacy beliefs and on approaches to teaching of Finnish and English university teachers. Paper presented at the EARLI SIG Higher Education Conference, June.
- Postareff, L., Katajavuori, N., Lindblom-Ylänne, S., and Trigwell, K. (2008). Consonance and dissonance in descriptions of teaching of university teachers. *Studies in Higher Education* 33 no.1: 49-61.
- Postareff, L., and Lindblom-Ylänne, S. 2008. Variation in teachers' descriptions of teaching: Broadening the understanding of teaching in higher education. *Learning and Instruction* 18, no.2: 109-120.
- Postareff, L., Lindblom-Ylänne, S., and Nevgi, A. 2007. The effect of pedagogical training on teaching in higher education. *Teaching and Teacher Education* 23: 557-571.
- Prosser, M., Ramsden, P., Trigwell, K., and Martin, E. 2003. Dissonance in experience of teaching and its relation to the quality of student learning. *Studies in Higher Education* 28: 37-48.
- Prosser, M., and K. Trigwell. 1999. *Understanding learning and teaching. The experience in higher education*. Buckingham: Open University Press.
- Prosser, M., and Trigwell, K. 2006. Confirmatory factor analysis of the approaches to teaching inventory. *British Journal of Educational Psychology* 76: 405-419.
- Samuelowicz, K., and Bain, J.D. 1992. Conceptions of teaching held by academic teachers. *Higher Education* 24: 93-112.
- Singer, E. 1996. Espoused teaching paradigms of college faculty. *Research in Higher Education* 37: 659-679.
- Stes, A. 2008. *The impact of instructional development in higher education: effects on teachers and students*. Gent: Academia Press.
- Stes, A., Coertjens, L., and Van Petegem, P. 2010. Instructional development for teachers in higher education: impact on teaching approach. *Higher Education* 60, no.2: 187-204.
- Stes, A., De Maeyer, S., and Van Petegem, P. 2010. Approaches to teaching in higher education: Validation of a Dutch version of the Approaches to Teaching Inventory. *Learning Environments Research* 13, no.1: 59-73.
- Stes, A., Gijbels, D., and Van Petegem, P. 2008. Student-focused approaches to teaching in relation to context and teacher characteristics. *Higher Education* 55, no.3: 255-267.
- Trigwell, K., and Prosser, M. 1996. Changing approaches to teaching: A relational perspective. *Studies in Higher Education* 21, no.3: 275-284.
- Trigwell, K., and Prosser, M. 2004. Development and use of the approaches to teaching inventory. *Educational Psychology Review* 16: 409-425
- Trigwell, K., Prosser, M., and Taylor, P. 1994. Qualitative differences in approaches to teaching first year university science. *Higher Education* 27: 75-84.
- Trigwell, K., Prosser, M., and Ginns, P. 2005. Phenomenographic pedagogy and a revised Approaches to Teaching Inventory. *Higher Education Research and Development* 24: 349-360.
- Trigwell, K., Prosser, M., and Waterhouse, F. 1999. Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education* 37: 57-70.
- Åkerlind, G. S. 2003. Growing and developing as a university teacher – Variation in meaning. *Studies in Higher Education* 28: 375-390.

Table 1. Properties of the clusters

Cluster	Respondents	Conceptual change	Discussion: teacher - student	Discussion: students	Information transmission	Test-focus
A	111	3.59 (0.61) _a	4.33 (0.62) _d	3.87 (0.75) _h	3.79 (0.50) _k	3.89 (0.61) _n
B	89	2.93 (0.69) _b	2.67 (0.80) _e	1.94 (1.08) _i	3.99 (0.42) _l	3.76 (0.53) _n
C	94	4.25 (0.49) _c	4.61 (0.53) _f	4.27 (0.65) _j	2.91 (0.60) _m	2.88 (0.72)
D	83	3.77 (0.51) _a	3.97 (0.83) _g	1.89 (0.71) _i	3.88 (0.53) _{k,l}	3.67 (0.64) _n
Total	377	3.64 (0.74)	3.93 (1.01)	3.08 (1.34)	3.64 (0.67)	3.56 (0.74)

Note: SD between brackets. Means that do not share sub-scripts differ at $p < .05$.

Table 2. Overview of the qualitative differences between clusters

Cluster	Respondents	Conceptual change	Discussion: teacher - student	Discussion: students	Information transmission	Test-focus
A	7 (111)	High or moderate	High	High or moderate	High	High
B	11 (89)	Low	Low	Low	High	High
C	4 (94)	High	High	High	Low	Low
D	8 (83)	High or moderate	Moderate	Low	High	High

Note: Number of respondents regarding the inventory between brackets.

Table 3. Variation in terms of gender and discipline of the four profile groups

	Cluster A	Cluster B	Cluster C	Cluster D
Men (n=159; 60.7%)	45 (55.6%)	49 (75.4%)	34 (50.7%)	31 (63.3%)
Women (n=103; 39.3%)	36 (44.4%)	16 (24.6%)	33 (49.3%)	18 (36.7%)
Hard sciences (n=123; 53%)	36 (51.4%)	39 (68.4%)	23 (37.7%)	25 (56.8%)
Soft sciences (n=109; 47%)	34 (48.6%)	18 (31.6%)	38 (62.3%)	19 (43.2%)

Figure 1. Visual representation of the main differences between the clusters

