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Video Cases in Teacher Education: A review study on intended and achieved learning objectives by video cases

This literature review focuses on the use of video cases in the education of pre-service teachers as a means of achieving higher order learning objectives that are necessary for gaining situated knowledge. An overview of both intended and achieved learning objectives in relevant studies involving the use of video cases is provided, which shows that video cases are indeed being used with the intention of achieving learning objectives. However, the number of achieved lower learning objectives is slightly higher than the number of achieved higher learning objectives. Further research is needed to explore how video cases can be fit into the curriculum to achieve the highest possible yields in terms of learning objectives, particularly since the difference between intended and achieved learning objectives gives rise to the assumption that educators are still searching for ways to achieve higher order learning objectives.

Keywords: Videotape Recordings; Preservice Teacher Education; Student Teachers; Teacher Knowledge; Learning Strategies

Introduction

Teachers deal with a wide array of situations in the dynamic environment of their everyday teaching practice. In order for pre-service teachers to be prepared for the complexity of teaching in this dynamic environment, it is essential that they acquire knowledge that helps them decide on how to act in specific situations while at the same time properly educating their pupils (HBO-raad, 2011; Plecki, Elfers, & Nakamura, 2012; Stronge, Ward, & Grant, 2011). This kind of knowledge, which allows teachers to choose a correct way of handling specific teaching situations, is also known as ‘situated knowledge’. Situated knowledge contains pedagogical content knowledge and is ideally both embedded and embodied, as will be explained below.

Pedagogical content knowledge combines knowledge of the subject that is being taught and pedagogical knowledge. It enables teachers to understand how specific

content is organised and how it can be presented in a way that suits the interests and abilities of their pupils (Even, 1993; Saeli, Perrenet, Jochems, & Zwaneveld, 2012; Shulman, 1987). Effective teachers are both pedagogues and experts in their subject (Keijzer & Kool, 2012; Shulman, 1987).

If the teaching context can be defined clearly, the retrieval of this knowledge is relatively simple. For instance, the teacher has to prepare a lesson for tomorrow and is able to successfully do this because the teacher knows his pupils and knows how to present the subject in a way that it caters to the needs of his pupils. However, in an unforeseen and complex teaching context it is often quite difficult, if not impossible, for pre-service teachers to immediately reflect on previous knowledge of facts and strategies that might help them to adequately operate in this particular context. An example of such a complex teaching context is a classroom disturbance. Most experienced teachers will know how to react in an adequate way, but they do not necessarily have to retrieve an explicit strategy on how to deal with this disturbance before they start acting. Their actions are based on the interplay of their own teaching experience and the material resources of the current teaching context (Nonaka, Toyama, & Konno, 2000). This means that experienced teachers use their *embedded knowledge*, which is knowledge that is supported by and partially represented in the complex patterns of interaction with the context, for instance in the form of tools that are typical parts of the context in which a particular form of knowledge is required. Every experience with classroom disturbances, for example, helps shape the teachers' concept of the many forms of classroom disturbances and leads to a development in their embedded knowledge.

Embedded knowledge contains some forms of explicit knowledge, but is mostly implicit. *Explicit knowledge* is knowledge that can be retrieved from memory and

formulated explicitly, for instance in the form of guidelines that teachers can verbalise. *Implicit knowledge* is the ability to act a certain way in a particular context in which this behaviour is functional.

Besides developing embedded knowledge, pre-service teachers should also ideally develop embodied knowledge. *Embodied knowledge* is gained by 'doing', by actually physically being present in the teacher context (Blumentritt & Johnston, 1999; Lam, 1997). That is why such knowledge can only be developed by contextual experiences (Blumentritt & Johnston, 1999; Smith, 2005). As experienced teachers deal with contextual, real-life classroom situations on a daily basis, their embodied knowledge is often far greater than that of pre-service teachers. However, since this kind of knowledge can only be developed by personal, physical experiences, it is quite difficult to pass on to others (Blumentritt & Johnston, 1999). Similarly to implicit embedded knowledge, embodied knowledge depends on the situation and on the experience that a teacher has acquired. Embodied knowledge includes the teacher's experiences with internalizing ways of carrying out particular strategies. In the case of classroom disturbances, for example, a useful strategy could be moving into the physical proximity of the troublemaker. By actually putting the strategy into action and experiencing it, the pre-service teacher will be able to recognise and act on such situations at an earlier stage in the future (Clark, 1997).

To conclude, experienced teachers make use of readily available holistic and contextual *situated knowledge* that is linked to the specific situation, which is generated by a direct interaction between previous experiences and the current context in their daily teaching practice. Pre-service teachers, who have limited practical experience, still need to develop this situated knowledge which is quite a challenge.

The role of higher-level learning methods and objectives in the acquisition of situated knowledge

In order to teach pre-service teachers how to develop situated knowledge, teacher educators should set learning objectives that explicitly address the situated nature of this knowledge. Apart from determining the knowledge domain of the learning objective, educators should also clearly indicate at what level this goal should be mastered. The focus of the instruction for the acquisition of situated knowledge should revolve around learning objectives such as analysing and evaluating complex teaching situations. Analysing and evaluating are quite useful higher order learning methods for the development of situated knowledge in pre-service teachers. They provide them with an opportunity to think critically about the practice of teaching in connection with theoretical concepts and strategies, which helps them prepare for their own future teaching practice (Yung, Wong, Cheng, Hui, & Hodson, 2007).

The internationally most used taxonomy for the classification of learning objectives and the related methods in teacher education is the Bloom taxonomy(Athanassiou, McNett, & Harvey, 2003; Furst, 1981) which has been revised by Krathwohl (2002). This taxonomy consists of a hierarchy of six levels at which learning objectives can be mastered in a cognitive domain: Remember, Understand, Apply, Analyse, Evaluate, and Create. In Table 1, examples are given for each of the learning objectives. The hierarchal composition indicates that the lower order learning objectives Remember, Understand and Apply are the basis for achieving the higher order learning objectives Analyse, Evaluate and Create. Lower order learning objectives, such as the reproduction of knowledge, are therefore not separate objectives, but means of achieving higher order learning objectives as well as situated knowledge.

Determining the level of mastery helps teacher educators accurately describe the

behaviour that pre-service teachers should be able to show when they have achieved the learning objective set by the teacher educator. It is a first step in choosing the right learning methods to reach a certain learning objective. Exercises that aim to achieve these higher order learning objectives will not only help pre-service teachers remember, understand and apply knowledge (lower order learning levels), but will also challenge them to analyse and evaluate the situation and to come up with their own solution for the problems they are faced with (higher order learning levels) (Simons, 1999). Pre-service teachers need to reach higher levels of mastery in order to acquire the necessary knowledge for performing effectively in the complex teaching practice.

Video cases as a means of achieving higher order learning objectives

Using written cases as a means of helping students deal with complex situations, was first implemented by the Harvard Law School in 1870. By showing the students cases, they were confronted with unfamiliar, complex situations (Garner, 2000). This made Harvard the first educational institute to offer education that included case activities. The trend spread to other fields of education for which students were required to make decisions in complex situations, such as teacher education. A recent development in the area of cases in education is the use of video cases. Research is carried out in teacher training programmes into the effect of video cases on learning outcomes. However, the relationship between the use of video cases in teacher education, reaching higher order learning objectives and dealing with complex situations, has not yet been clearly documented.

Video cases present information in a holistic and contextual manner, which corresponds with the way in which real teachers are confronted with pedagogical and didactical problems. It has been shown that this is not possible with a written case (Blijleven, 2005). By watching video cases and making use of their own theoretical

knowledge, pre-service teachers are able to analyse specific real-life teaching situations and discover how an experienced teacher deals with these circumstances (Blijleven, 2005; Kurz, Llama, & Savenye, 2004). By analysing real-life situations through video, the student steps out of his role as a teacher and is able to study video-taped teacher activities objectively and 'from a distance' (Rosaen, Lundeberg, Cooper, Fritzen, & Terpstra, 2008; Van Es & Sherin, 2002). The analysis of video cases contributes to the students' belief that they can acquire the skills, knowledge and attitudes necessary to effectively function as a teacher as well (Shulman, 1992). This means that the use of video cases could be an excellent way of helping pre-service teachers develop situated knowledge, even though physical experience in the teaching context of course remains important as well.

There are a few prerequisites for the use of video cases: research indicates that video cases should be relevant to the field of expertise, but above all that the case should be carefully embedded into the curriculum (Moreno & Valdez, 2007; Van den Berg, Wallace, & Pedretti, 2008; Yung, Wong, Cheng, Hui, & Hodson, 2007). Video cases that show examples of specific teaching situations in a holistic and contextual way can help pre-service teachers acquire situated knowledge only if teacher educators formulate learning objectives and levels that fit the content of the case and the curriculum. It has not yet been empirically documented if and to what extent video cases are being used in teacher training classes to achieve these higher order learning objectives.

It is important to note that video cases cannot provide embodied knowledge, since the pre-service teacher is not part of the video case, but is only involved in viewing the video case. However, the process of discussing practical experiences seen in the video case can support the pre-service teachers' behaviour in their own future

teaching practice. Not being part of the case has an advantage in that it facilitates the achievement of higher order learning objectives by means of analysis and reflection. Their situated knowledge can later be augmented by means of the practical experiences that pre-service teachers gain during internships, which allows them to acquire the necessary embodied knowledge.

Aim of this study

The aim of this study is to determine whether the holistic character of video cases is being utilized in the traditional classroom to contribute to the achievement of higher order learning objectives and thereby the development of situated knowledge. The research question of this review therefore is: 'Are video cases being used for achieving higher order learning objectives?' Since achieving higher order learning objectives is an important part of acquiring situated knowledge, it is presumed that teacher educators set higher order learning objectives for their students to help facilitate the acquisition of situated knowledge. Based on existing literature, that proves the effectiveness of video cases, the first hypothesis is that video cases are being used with the intention of achieving higher order learning objectives. The second hypothesis is that higher order learning objectives are reported as being achieved by the use of video cases.

Method

Selection of the articles

This literature review provides a selection of articles about video cases that were published between 2000 and 2012. The year 2000 was chosen as a starting point because the production and use of video has become relatively simple since that time, due to technological developments. The following five criteria were used in the selection of the articles: (1) the article must be about the use of a video case; (2) the

article must be about teacher education; (3) the article must contain descriptions of intended and/or achieved learning objectives; (4) the video case must be about someone other than the respondent (pre-service teacher), unless the case is viewed by a group of respondents which includes the main character from the case; and (5) the article was published between 1 January 2000 and 30 April 2012. The articles were retrieved from three databases: ERIC, SpringerLink, and Sage. These databases were chosen since they are known for containing a large number of education-related articles. By using multiple databases, articles from different fields of research and various continents could be selected. The following search terms were used: 'Video case', 'Pre-service teacher', 'Education', 'Method' and 'Teacher education'. These terms are based on keywords that are commonly used in journals and articles on the use of video cases in teacher-training education. This search resulted in nineteen articles that matched the criteria described above. An overview of these articles can be found in Table 2.

Categorization of Learning Objectives

Each article has been assessed by two individual researchers, who ascertained the intended and achieved learning objectives mentioned or implied in the text. Consensus reached by both researchers was used to increase the reliability of this judgement.

Krathwohl's revised Bloom's Taxonomy (2002), a generally accepted taxonomy, was used to categorise the learning objectives, see Figure 1. However, the learning objectives described by the articles only contain a description of the content knowledge, and not an explicit description of the mastery levels according to the Bloom taxonomy. From the description of the learning objectives however, it was apparent that the learning objectives could be traced back to the taxonomy. For example, if the verb 'analysis' was mentioned in the learning objective, then it was allocated to Bloom's level of mastery 'Analyse'. Most studies specified the learning objectives that might be

achieved by the use of video cases (intended learning objectives) in advance. The intended learning objectives were found in particular in the sections 'Introduction' and 'Method'. In contrast to the intended learning objectives, the achieved learning objectives were mostly found in the sections 'Results' and 'Conclusion'.

A pilot analysis revealed that a few learning objectives found in the articles could not be placed in Krathwohl's taxonomy. This was especially the case with learning objectives concerning 'Reflection' and 'Noticing'. For this reason, the data involving reflective learning objectives presented by these articles have been categorised into a separate category: 'Reflection'. A number of learning objectives explicitly identified as 'Noticing' could also be found within the identified learning objectives. According to Van Es and Sherin (2002) 'Noticing' consists of three parts: Determining what is important within a teaching situation; making connections between specific features of classroom interactions and the teaching and learning principles to which they belong; and thinking about classroom interactions in context, based on one's own knowledge. When it came to categorising 'Noticing', question arose whether or not it could be placed in the revised Bloom's Taxonomy (Krathwohl, 2002). It seemed at first that 'Noticing' could be placed in the 'Analyse' category, because analysing is about recognising patterns, among other things. However, further examination of the articles showed that learning objectives in the area of 'Noticing' are described as *seeing* certain aspects of the lesson without drawing conclusions. It was therefore decided not to place the 'Noticing' learning objectives in the 'Analyse' category, but instead to make another separate 'Noticing' category in the classification scheme. In Table 1, examples are given for each level of the revised taxonomy of Bloom, including the added 'Reflection' and 'Noticing' categories.

Results

Overview of the Identified Learning Objectives

The number of learning objectives that fit into each category of Bloom's Taxonomy is found in Table 3. The number of learning objectives in Table 3 clearly shows that many of the articles examined contain multiple learning objectives per case.

Table 3 consists of four columns. The first and third column indicate the amount of learning objectives that have been found to fit a particular category. They contain the total number of learning objectives, including the underlying learning objectives, as will be described below. Column number two and four contain the number of learning objectives at the highest level, without the underlying learning objectives. These columns are important for comparing the amount of learning objectives at their highest levels.

It is important to know that higher order learning objectives cover all underlying categories. In order to determine how many higher order learning objectives can be fit, for example, within the 'Evaluate' category, the number of learning objectives in the category at the next highest level (in this example the 'Create' category) must be inferred. Therefore the 'Evaluate' category in the second column contains six learning objectives. For example, there were three studies that involved pre-service teachers achieving the learning objective Create. This means that the underlying objectives from Evaluate to Remember have also been reached, as the higher learning objectives always cover all underlying objectives. The total number of times that Evaluate was achieved in the studies was nine, but it was the highest order learning objective in only six studies, since three of the achieved objectives still belong to the aforementioned three times that Create was the highest order learning objective. This procedure was used for each of the six learning objectives.

Table 4 contains findings on the additional categories ‘Reflection’ and ‘Noticing’. The ‘Reflection’ category contains six intended learning objectives. Four intended learning objectives could be fit into the ‘Noticing’ category.

‘Are video cases being used for achieving higher order learning objectives?’

The first column in Table 3 ‘intended learning objectives including their underlying objectives’, shows that a trend exists: the higher the learning objective, the lower the number of the total learning objectives. This implies a reduction in learning objectives as well as an increase in the level of objectives at the same time. This reduction leads to a pyramid-shaped graph, as shown in Figure 2. For example, the lowest learning objective ‘Remember’ contains 43 learning objectives, while the highest learning objective ‘Create’ consists of only three learning objectives.

The highest levels of the intended learning objectives in column two in Table 3, show that most of the learning objectives (ten objectives) can be placed in the lower order learning objectives category ‘Apply’ and in the second place into the higher order learning objective category ‘Analyse’ (nine objectives). The total number of higher order learning objectives Create, Evaluate and Analyse is 18, and the total number of lower order learning objectives Apply, Understand and Remember is 25. With N = 43, it is evident that video cases are indeed being used with the intention of achieving higher order learning objectives (42%), but to a slightly larger extent (58%) they aim towards lower order learning objectives.

Ten intended learning objectives could not be placed in the taxonomy in Table 3. As can be seen in Table 4, there were six intended learning objectives in the ‘Reflection’ category and four intended learning objectives in the ‘Noticing’ category.

Are higher order learning objectives reported as being achieved by the use of video cases?

While the analysed articles report on the intended and achieved learning objectives, this paragraph focuses on the achieved learning objectives only. In the third column of Table 3, a trend can be seen: numbers are lowest for the highest achieved learning objectives, while the lower learning objectives are more numerous. A reason for this is an overlap between higher and lower learning objectives: the lower objectives are a prerequisite for the higher ones. For this reason, the achieved learning objectives can be presented in a pyramid-shaped graph as shown in Figure 2. That more 'achieved' than 'intended' learning objectives were found in the articles is evident when making a comparison between column one and three of Table 3, and when looking at the difference in width of the two pyramids in Figure 2.

Column four in Table 3 shows that most of the learning objectives (20 objectives) can be fit in the lower order learning objectives category 'Understand' and in the second place into the higher order learning objectives category 'Analyse' (12 objectives). The achieved other higher learning objectives 'Create' and 'Evaluate' score five and six respectively. It is worth noting that the number of achieved learning objectives is quite high for Understand, but the distribution between the lower and higher learning objectives is still exactly the same as the distribution for the intended learning objectives: the number of achieved lower learning objectives is slightly higher (58%) than the number of achieved higher order learning objectives (42%).

The absolute number of achieved higher learning objectives (23) is larger than the number of intended higher learning objectives (18). The calculated p-value of this distribution, under the assumption that achieved and intended learning objectives have about the same probability of being mentioned, is $t(18) = -.79$, $p = 0.22$. This means

that the difference between the numbers of higher order learning objectives is not significant.

Ten achieved learning objectives could not be fit in the taxonomy in Table 3. As can be seen in Table 4, there were eight achieved learning objectives in the 'Reflection' category and two achieved learning objectives in the 'Noticing' category. The number of achieved 'Reflection' learning objectives (eight) is slightly higher than the number of intended 'Reflection' learning objectives (six). The number of achieved 'Noticing' learning objectives (two) is slightly lower than the number of intended learning objectives (four).

Conclusion and Discussion

The articles that have been reviewed in this study mainly report on the use of video case methods that have recently been developed. This means that the development of video cases and the use of video cases as an integral part of the curriculum are still in development. However, this review study shows promising results concerning the use of video cases as a learning method to facilitate the pre-service teachers' mastery of higher level learning objectives. It is worth noticing that more 'achieved' than 'intended' learning objectives were reported in the articles. This has probably to do with the exploratory nature of the articles; many articles focused on the process of developing the video materials, rather than the achievement of learning objectives.

The first hypothesis of this study, 'Video cases are being used with the intention of achieving higher order learning objectives', was confirmed. Situated knowledge can best be achieved by setting higher order learning objectives and these, as stated earlier, can be acquired by the use of video cases. Video cases are indeed being used in teacher education with the intention of achieving higher order learning objectives. The second hypothesis, 'higher order learning objectives are reported as being achieved by the use

of video cases' was also confirmed. The use of video cases helped pre-service teachers achieve higher order learning objectives Analyse, Evaluate and Create. These findings are in accordance with the theoretical framework of this study and support the main research question into whether video cases are being used for facilitating pre-service teachers' mastery of higher level learning objectives. Video cases provide a real-time, recognizable context for pre-service teachers, which helps them develop the situated knowledge they need to become effective teachers. However, this review reveals that the development of situated knowledge of pre-service teachers by video cases is not being used optimally yet, due to the fact that the studies focused slightly more on lower learning objectives (both intended and achieved) rather than higher learning objectives. Because the number of achieved lower learning objectives was slightly higher (58%) than the number of achieved higher order learning objectives (42%), including the underlying learning objectives, a pyramid-shaped graph arises as can be seen in Figure 2.

Looking at the results, it is worth noticing that the number of achieved higher order learning objectives (23) is higher than the number of intended higher order learning objectives (18). These results suggest that not all achieved higher order learning objectives were intentional, as not all of them were the actual intended learning objectives of the concerning studies. The precise mechanism of how video cases affect learning outcomes would therefore need to be examined further. For example, the influence of video cases on the methods for testing higher learning objectives should be investigated further. Apart from this, one might wonder if teacher-trainer education is actually focused more on achieving lower rather than higher order learning objectives. It is possible that teacher-educators are still searching for ways of achieving higher order learning objectives or are even still unaware of recognising the importance of doing

this. As this study shows, teacher-trainers should be aware of the promising possibilities of using video cases for achieving higher order learning objectives.

If video cases are to be used for achieving higher order learning objectives, attention needs to be paid to the development of relevant assignments for the video cases. Quantifying the effects of video cases is a necessary prerequisite for assessing whether the intended higher order learning objectives are actually being achieved by the use of video cases. Future research could focus on methods for the quantification of learning outcomes with the use of video cases. Suitable assignments should be developed to evaluate the effects in terms of learning outcomes with or without the use of video cases in specific areas of teacher-training education, such as classroom management.

Further research is needed to explore how video cases can be fit into the curriculum to achieve the highest possible yields in terms of learning objectives, particularly since the difference between intended and achieved learning objectives gives rise to the assumption that educators are still searching for ways to achieve higher order learning objectives.

Acknowledgements

This study was carried out within the lectorate ‘Werkplekleren en ICT [Learning at the workplace and ICT]’ funded by the NHL University of Applied Sciences in The Netherlands.

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List of Tables

Table 1. Examples of Learning Objectives Found in Studied Articles

Level of revised Bloom Taxonomy	Example
Create	Proposing alternative strategies (article 13)
Evaluate	Critically examining teaching practice (article 9)
Analyse	Analysing teaching from multiple perspectives (article 5)
Apply	Applying theoretical concepts in simulated classroom situations (article 3)
Understand	Understanding the theoretical principles that have been learned (article 11)
Remember	Remembering more details about the implementation of the teaching strategy (article 2)
Reflection	Learning to reflect in a more efficient way (article 5)
Noticing	Attending to important elements of teaching (article 14)

Table 2. Overview of Analysed Articles

Article	Reference
1	Bencze, L., Hewitt, J., & Pedretti, E. (2001). Multi-media Case Methods in Pre-service Science Education: Enabling an Apprenticeship for Praxis. *Research in Science Education, 31*(2), 191-209.
2	Dieker, L. A., Lane, H. B., Allsopp, D. H., O'Brien, C., Butler, T. W., Kyger, M., et al. (2009). Evaluating Video Models of Evidence-Based Instructional Practices to Enhance Teacher Learning. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children, 32*(2), 180-196.
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Table 3. Summary of Learning Objectives in the Articles Fitting Bloom's Taxonomy

Category	Intended learning objectives		Achieved learning objectives	
	Including underlying	Highest order	Including underlying	Highest order
Create	3	3	5	5
Evaluate	9	6	11	6
Analyse	18	9	23	12
Apply	28	10	30	7
Understand	36	8	50	20
Remember	43	7	55	5
N	137	43	174	55

Table 4. Summary of Learning Objectives in the Articles Not Fitting Bloom's Taxonomy

Category	Intended learning objectives	Achieved learning objectives
Reflection	6	8
Noticing	4	2
N	10	10

Figure Captions

Figure 1. Revised Bloom's taxonomy (according to Krathwohl (2002)).

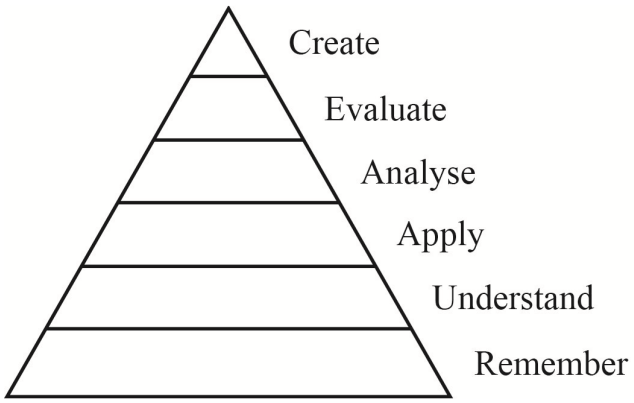
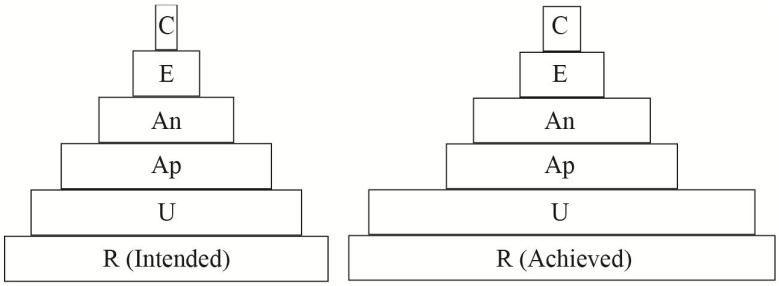


Figure 2. Chart of intended and achieved learning objectives in teacher training using video cases.



	Intended learning objectives	Achieved learning objectives
Create (C)	3	5
Evaluate (E)	9	11
Analyse (An)	18	23
Apply (Ap)	28	30
Understand (U)	36	50
Remember (R)	43	55