‘Assessment drives learning’: Do assessments promote high-level cognitive processing?

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Abstract

Students tend to learn in the way they know, or think, they will be assessed. Therefore, to ensure deep, meaningful learning, assessments must be geared to promote cognitive processing that requires complex, contextualised thinking to construct meaning and create knowledge. Bloom’s taxonomy of cognitive levels is used worldwide to assist in preparing assessment materials. The taxonomy entails the classification of cognitive actions into six, increasingly complex, levels.

The aim of the study was to determine at which cognitive levels students were tested in summative assessments, as that would indicate the cognitive levels students employed in their learning. A document analysis design was used.

A major finding was that assessments did not focus sufficiently on higher level cognitive skills to ensure that the students become deep learners. Using critical intellectual abilities such as decision-making and problem-solving skills, creativity, critical thinking, objective evaluation, and applications in varying contexts and in authentic situations was seldom required of students.

INTRODUCTION

One of the challenges of teaching-learning is the shift from content-based education to student-centred education. Accepting and adapting to new modes of teaching and learning have been described as a radical paradigm shift. This paradigm shift focuses on producing deep learning instead of providing instruction.

At a conference a panel of students was asked how they learned at their institution, and they went on to explain at length what the lecturers did in the class rooms. No-one claimed responsibility for their own intellectual growth – education had ‘happened to’ them (Mezeske 2004). The shift from content-based education to student-centred education seems to be as difficult for students as for lecturers.
A challenge that relates to the above mentioned is assessment. Students tend to learn in the way they know, or think, they will be assessed (Biggs 2003). Therefore, to ensure that deep learning takes place, assessments must be geared at assessing students at the higher cognitive levels, that is, the type of cognitive processing that will require complex, contextualised thinking to construct meaning and create knowledge from information. Bloom’s taxonomy of learning (1956), updated by Anderson and Krathwohl (2001), provides a continuum of cognitive processing, starting at the lower levels of remembering and understanding, moving through application and analysis to evaluation and creativity as the higher levels.

In this article assessment of student learning and how it may contribute to deep and significant learning is discussed. An empirical study was conducted using Bloom’s taxonomy to determine whether deep learning is facilitated by the assessments in a Faculty of the Humanities.

DEEP AND SIGNIFICANT LEARNING

What is deep learning? One way to answer this question is to reflect on what deep learning is not. Deep learning cannot take place when students are taught to be passive. To be passive means that lecturers provide students with already processed information during lectures, the students receive assignments with exact instructions, they (the students) are told what to prepare for assessments, and the lecturers conduct the assessments – in fact, what do the students have to do? They only need to get the right answer (the lecturer’s), and they expect that every action they take, will render a reward in terms of marks, and, in the final instance, they work just enough to pass (Mezeske 2004).

What encourages deep learning? Content should be the means, not the end to promote learning; lecturers must be guides of learning and not ‘transmitters’ of knowledge, there must be a realization that information is not knowledge – lecturers, books, information technology may provide information, but the students have to make meaning of it, turn it into knowledge (Biggs 2003). That means that the responsibility for their learning is shifted to the students. Assessments must be geared at promoting learning, not merely at generating marks. Assessments tend to keep on assessing students’ memory skills instead of their higher cognitive skills, lecturers tend not to provide them with opportunities to reflect on their learning; they train students for exams, instead of inciting in them enthusiasm for making meaning and a curiosity to know more (Mezeske 2004). Lecturers should focus more on developing skills and attitudes that will last a lifetime, rather than on knowledge and simple understanding. By that we do not mean that students should not memorise and understand fundamental concepts any more, but when it comes to assessment we need to determine whether they can use those concepts (Suski 2004).

To bring about deep or significant learning in students we need to engage them in higher order thinking, that is, the type of cognitive processing that will require complex, contextualised thinking to construct meaning and create knowledge from information (Fink 2003).
For learning to occur, change has to take place. For significant learning to occur, the change must be lasting and must have an impact on the learner’s life (Fink 2003, 8–9). What we should do, is ask ourselves: What will the students know and be able to do in two to five years’ time? That points to significant learning.

Lecturers cannot ‘cover’ all the content students ever need to know about a subject. Cramming does not result in learning that will last. Alternatively, if students learn how to apply basic content, how that is related to other knowledge, understand the human implications of what they have learned, and come to care about the subject and want to know more, it is likely that they will retain what they have learned better, and will continue to expand their knowledge after the course has been completed – indicating deep and significant learning (Fink 2003).

According to the constructivist approach to teaching and learning, learning is not a passive process – receiving information is not learning; learning involves ‘making meaning of information’. Making meaning refers to developing connections between existing knowledge and new information – constructing and reconstructing knowledge to make it meaningful (Biggs 2003, 14–15). Jordan, Carlile and Stack (2009, 56) describe constructivism as the view that knowledge cannot be acquired through a process of information transmission; rather, knowledge is actively constructed in our efforts to make sense of the world.

**ASSESSMENT OF STUDENT LEARNING**

Assessment of learning has undergone major shifts in recent times and much has been written about it due to international developments and research. Assessment of student learning is described by Suski (2004, 3) as an ongoing process, whereby outcomes for student learning are formulated, learning opportunities are created to enable students to achieve these outcomes, evidence is collected, analysed and interpreted to determine the extent to which the outcomes have been achieved, and the information that has been collected is used to improve student learning.

The aim of assessment is to determine the extent to which learning outcomes have been achieved, based on assessment criteria. The reasons for assessment, however, are not that simple and lecturers include the following in their rationale for assessments (Bezuidenhout 2007):

- To determine what students know, understand and can do
- To inform students of weaknesses in their performance and how to improve
- To illustrate to them their progress and ensure that a proper standard has been achieved before they progress to a next level
- To provide a means for certification regarding the standard of performance
- To serve as a promotion technique
- To indicate to students areas of importance in the learning material
- To serve as motivation for students
To measure the effectiveness of teaching; thus serving as a leverage for improvement in education.

Effective learning means that lasting change must take place. There is a common saying in education that learning means nothing if it cannot be applied. These two observations then imply that deep learning is required (for lasting change to take place), and for learning to be applied, meaning must be given to new information in order to convert it to knowledge that can be applied/used in different contexts (Fink 2003). Higher order thinking thus comes into play, and to bring that about, lecturers, first, have to pay attention to the cognitive level at which the outcomes they formulate, are pitched, and then to align their assessments with the outcomes.

A theory which should influence the way in which assessments are planned and conducted, is the ‘assessment drives learning’ theory, meaning that students will learn in the way they perceive they will be assessed; therefore the way in which learning outcomes are formulated is of utmost importance, as these outcomes will guide the students in their learning (cf. Biggs 2003). Jordan et al. (2009, 31) define a learning outcome as ‘an explicit statement of what a learner will be able to do as a result of completing a course of study’. A learning outcome statement thus should include

- an action word, expressing exactly what action or behaviour a student must demonstrate;
- a context, which explains the conditions required for the performance;
- a standard, indicating what is regarded as acceptable performance; Jordan et al. (2009, 31) call this ‘the performance threshold required’.

A learning outcome thus is the ‘contextually demonstrated end-product of the learning process’ (SAQA 2001, 70). A learning outcome should go further than merely specifying the subject content, and should include reference to the knowledge, skills, values and attitudes a student needs as proof of having achieved the outcome; that is, a description of what students should know and be able to do to demonstrate competence, as well as the specific context in which this should be demonstrated (SAQA 2001, 21). Thus: When they are assessed, students must DO something to DEMONSTRATE what they know and understand (knowledge), can do (skills) and how they do it in a specific context (reflexive competence; attitudes and behaviour).

Integrated assessment is a basic principle of assessment which should never be overlooked for its importance in bringing about deep and significant learning. In integrated assessment applied competence is assessed, which is a combination of practical, foundational and reflexive competence (SAQA 2001, 11). Table 1 explains what applied competence entails.
Table 1: Applied competence as applicable in integrated assessment

<table>
<thead>
<tr>
<th>Practical competence</th>
<th>Foundational competence</th>
<th>Reflexive competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>The demonstrated ability to perform a set of tasks and actions in authentic contexts (situations). A range of actions or possibilities is considered, and decisions are made about which to action to take.</td>
<td>The demonstrated understanding of what is being done and why it is being done. This underpins the practical competence and thus the actions taken.</td>
<td>The demonstrated ability to integrate performance with understanding in order to be able to adapt to changed circumstances appropriately, and explain the reason behind an action.</td>
</tr>
</tbody>
</table>

In higher education it is important to ensure applied competence, which means that assessment has to take place in an integrated way and at higher cognitive levels where decision-making skills, analysis and synthesis, evaluation and creativity play a role in order to be able to adapt to changed circumstances/contexts, and explain the reasons behind the actions taken (SAQA 2001).

In the Faculty of the Humanities where this study was conducted, use is made of formative and summative assessments of student learning. The summative assessments still take place mostly by means of written examinations. It is expected of lecturers to align the assessment items used in their assessment instruments with the learning outcomes they have formulated, to make use of integrated assessments, and to ensure that assessments comply with the requirements of the basic principles of assessment, namely reliability, validity, feasibility, and fairness (Faculty of the Humanities 2008.)

The major idea of Bloom’s taxonomy is that what educators want students to know and do (encompassed in statements of educational objectives), can be arranged in a hierarchy from less to more complex. The levels are understood to be successive, so that one level must be mastered before the next level can be attained (Huit 2011, 1).

BLOOM’S TAXONOMY: THE ORIGINAL AND REVISED VERSION

In the 1950s Benjamin Bloom worked with Ralph W. Tyler (his mentor) in the examiners’ office in Chicago. During that time, he (Bloom) directed his attention to the development of specifications through which educational objectives could be organised according to their cognitive complexity. His rationale was that the development of such a hierarchy would provide examiners with a more reliable procedure for assessing student learning and the outcomes of educational practice. Bloom’s first book was called the Taxonomy of educational objectives: Handbook 1: The cognitive domain (Bloom et al. 1956). This publication has been used throughout the world to assist in the preparation of assessment materials. The taxonomy of the cognitive domain is based on the idea that cognitive actions can be classified into six, increasingly complex, levels. Each subsequent level depends upon the student’s ability to perform at the level or levels that precede it – that is why the classification is called a taxonomy. In the original version of the taxonomy, the ability to evaluate implied the ability of performing processes at the highest level of the cognitive
domain. To be able to perform at the highest cognitive level, students need to have the necessary information, understand the information, and be able to apply it, be able to analyse and synthesise it and eventually to evaluate it. The higher levels thus always include the lower levels. The taxonomy was an effort to hierarchically classify cognitive processes (Eisner 2000, 3).

The last 40 years has confirmed the taxonomy as a hierarchy with the exception of the last two levels. It is uncertain at this time whether synthesis and evaluation should be reversed (i.e. evaluation is less difficult to accomplish than synthesis) or whether synthesis and evaluation are at the same level of difficulty, but use different cognitive processes. The two highest, most complex levels of synthesis and evaluation were reversed in the revised model, and were renamed evaluating and creating by Anderson and Krathwohl (2001). No empirical evidence was provided for this reversal, because these two highest levels are essentially equal in level of complexity. What is important in reversing the order of the highest two levels, was Anderson and Krathwohl’s (2001) attempt to bring the taxonomy more in line with the modern view of outcome-focused education, and changing the descriptors of the levels from nouns to active verbs, for example, ‘knowledge’ became ‘memorisation’, ‘comprehension’ became ‘understanding’, ‘application’ became ‘applying’ and ‘analysis’ became ‘analysing’.

RESEARCH PROCESS
The study reported here was conducted in a Faculty of the Humanities in 2009. The aim of the study was to determine at which cognitive levels students were tested in the summative assessments in some programmes in the Faculty. The rationale for the study was that quality assurance activities (moderation of assessment instruments) in the Faculty had brought to light that assessments occurred mostly at the lower cognitive levels of memorisation and understanding, with some basic application, rather than the levels that would be more suitable in higher education, namely application in different contexts, analysis, synthesis and creativity (S&C), and evaluation. From samples of examination papers that had been examined, it seemed that using critical intellectual abilities such as decision-making and problem-solving skills, creativity, critical thinking, objective evaluation, and applications in varying contexts and in authentic situations was seldom required of students during the summative assessments.

For about three years prior to the study, a series of in-house workshops and information sessions were presented to inform academic staff of outcomes (including suitable action words to use), assessments, cognitive levels (and explanations of how action words used determine the cognitive level at which students will operate to respond), deep learning, and related topics. These academic staff development sessions, which formed part of an on-going academic staff enrichment programme, usually were presented during lunch hours to afford as many as possible lecturers the opportunity to attend, but nonetheless a maximum of about 20 per cent of staff
members would attend a specific session (attendance was not compulsory). Overall, however, about 70 per cent of the academic staff attended one or more of these development sessions on assessment of student learning. Having not attended all the sessions in the series, however, might have resulted in gaps in the information we wanted to bring home to them.

The study design was that of a document analysis. Lecturers were requested to analyse recently used assessment instruments (examination papers) in terms of the cognitive levels addressed in the items contained in the instruments. This survey formed part of the quality assurance activities of the Faculty. It was decided to request the lecturers to do the analyses themselves, as self-evaluation plays an important role in quality assurance, and we wanted the staff to master the skill of analysing their assessment instruments. The Faculty Teaching-learning Manager visited all the participating departments in the Faculty, and the participants received clear guidelines and instructions on how to do the analysis.

The method used for data collection in the study was a questionnaire survey. Academic staff members were requested to analyse their assessment instruments (exam papers) in terms of an assessment blueprint (Smit 2004). On this blueprint they had to indicate the relevant importance of the part of the curriculum covered by a specific assessment item, the marks per question, and the emphasis of the questions in the cognitive domain (Table 2).

Table 2: Blueprint for assessments (Smit 2004)

<table>
<thead>
<tr>
<th>Specification grid or exam blueprint</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module code</strong></td>
</tr>
<tr>
<td>Questions</td>
</tr>
<tr>
<td>Question 1</td>
</tr>
<tr>
<td>Question 2</td>
</tr>
<tr>
<td>Question 3</td>
</tr>
<tr>
<td>Question 4</td>
</tr>
<tr>
<td>Question 5</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*The scale

- Remember: R
- Understand: U
- Apply: Ap
- Analyse: An
- Synthesise & Create: S&C
- Evaluate: E
only academic staff members presenting modules where paper and pen final examinations were used were invited to participate – the survey was not a random selection. Seventy-eight questionnaires (completed blueprints) were returned, but thirteen were discarded due to incomplete information and/or misinterpretation of the instructions on how to complete the questionnaire. Thus sixty-five questionnaires were used in the analysis. The Faculty had 205 academic staff members at the time, but only selected modules were included in the sample, the inclusion criteria being that participation was voluntary, only assessment instruments that had been used the previous semester for course work modules with written examinations were to be used, and the assessment instruments had to contain multiple assessment items. This was meant to be a self-evaluation process for the participating staff members. Participating departments were: English, Political Science, Afrikaans, Dutch, German and French, Music, Human Movement Science, Communication and Information Studies, Psychology, School of Education (various departments), Afro-Asiatic Studies, Sign Language and Language Practice, African Languages, Social Work, Higher Education Studies, History, and Governance and Political Transformation.

The questionnaire (Smit’s Blueprint 2004) requested participants to indicate the balance in the assessment instrument (the time for completion, the extent to which the content of the module was covered – emphasis in the module should correlate with marks per question), and the cognitive level at which students were required to operate in responding to the various questions. For purposes of this report attention will only be paid to the latter aspect, i.e. the cognitive levels. The participants were also requested to submit the examination paper (assessment instrument) they had analysed and the accompanying memorandum/rubric with the completed questionnaire. The teaching-learning manager analysed a sample of the examination papers for triangulation purposes.

Anderson and Krathwohl’s (2001) revised taxonomy of educational objectives were used in the survey. This taxonomy can be defined as ‘a hierarchy of cognitive processes involved in learning in the cognitive domain’ (Killen 2010, 97). The various cognitive processes defined in Anderson and Krathwohl’s taxonomy grid are remember, understand, apply, analyse, evaluate and create. The grid was adapted for the questionnaire and contained the following indicators for the cognitive domain: remember, understand, apply, analyse, synthesise and create, and evaluate. This adaptation was made after discussions with lecturers indicated that they preferred to combine synthesis (putting parts together to form a new whole) and creativity, and that they agreed with Bloom’s original taxonomy (1956) that evaluation should be the highest level. In higher education remember, understand and apply are regarded as the lower levels, and the remainder as the higher levels, at which assessment items preferably should be pitched to ensure deep learning. Please note that to understand the taxonomy one must realise that the higher levels of necessity always include the lower levels. Table 3 depicts an example of a completed questionnaire.
Table 3: Completed blueprint for a 3rd-year module

<table>
<thead>
<tr>
<th>Specification grid or exam blueprint</th>
<th>Emphasis in module</th>
<th>Marks per question</th>
<th>Emphasis in cognitive domain** (Bloom’s Revised Taxonomy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>%</td>
<td>R</td>
<td>U</td>
</tr>
<tr>
<td>Question 1</td>
<td>15</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Question 2</td>
<td>50</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Question 3</td>
<td>15</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Question 4</td>
<td>10</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Question 5</td>
<td>10</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>100</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100--</td>
<td>24</td>
</tr>
</tbody>
</table>

**The scale:

- Remember (R)
- Understand (U)
- Apply (Ap)
- Analyse (An)
- Synthesise & Create (S&C)
- Evaluate (E)

The total marks on the assessment instruments (question papers) that had been analysed differed in some cases. Some counted 50 marks, others 180 and others 100. The totals, therefore, were standardised to 100. Some of the scales (20 questionnaires) were arranged in a different order. ‘Evaluate’, for instance, appeared before ‘Synthesise and Create’. This was not regarded as problematic, as the switched order did not influence the fact that both were still regarded as higher order processes.

Examples of assessment items used in the exam papers that were analysed are the following:

- **List the three branches of government** (lowest level – memorisation)
- **Describe the four sections of the interactive phase of the structure of a lesson** (understanding)
- **By means of applicable examples differentiate between the substantive and syntactical nature of Life Sciences** (application and analysis)
- **Interpret Mercia’s 19FII results, referring to her likes and dislikes. Construct an action plan with recommendations of possible career choices Mercia might consider** (analysis, synthesis and creation)
- **Do you consider musical toys with digitised components an educational toy with value? Motivate your answer** (evaluation).

The results on the completed questionnaires were compared with the memoranda/rubrics the participants had to attach to the completed blueprint to ensure that they had completed the questionnaire correctly, and to make an estimate of whether the
completed questionnaires were a true reflection of the cognitive levels addressed in the assessment instruments.

RESULTS

For reporting purposes the different modules were divided into first-year modules, second-year modules, third-year modules, and post-graduate modules. The purpose of dividing the modules into different groups was to determine whether higher cognitive levels were emphasised more in later study years. Graphs were compiled for the different modules. The results indicated the following:

First-year modules

Twenty-four of the questionnaires received back contained information on first-year modules. The majority of the assessment items (questions) in these exam papers were pitched at the two lower levels of the cognitive domain. 25.91 per cent indicated Remember and 25.85 per cent Understanding (in total, 51.76% of the cognitive domain). Application scored 16.19 per cent and Analysis 13.67 per cent. Synthesise and Create had the lowest score of 8.25 per cent with Evaluation the second lowest score of 10.13 per cent. (See Figure 1).

![Figure 1: Mark allocation: First-year modules](image)

Senior (2nd- and 3rd-year) modules

The two aspects of the cognitive domain that scored the highest in this section are Understand (21.86%) and Evaluate (21.84%). Apply (16.53%) and Analyse (16.15%) follow with Synthesise and Create (13.50%) the second lowest, and Remember (10.08%) the lowest score (Figure 2).

Of the 22 papers 13 had no mark allocation at the level of evaluation, and 12 had no marks allocated at the level of synthesis and creativity. In two of the papers all the marks were allocated to higher order cognitive skills, namely analysis and
evaluation (24 per cent and 76%; and 40% and 60% respectively). Four of the papers indicated a distribution of marks across all six possible cognitive levels (see Figure 3 for an example).

![Figure 2: Mark allocation: 2nd and 3rd-year modules](image)

Interesting differences appeared when these senior-year modules were broken down into second- and third-year modules respectively.

Twelve of the completed questionnaires dealt with second-year modules (Figure 3). Understanding scored significantly high (32.00%), again pitching at the second lowest level of the cognitive domain. The second highest score is Evaluation (15.85%) followed by Analysis (15.74%) and Application (12.65%). The lowest score is Remember with 10.87 per cent.

![Figure 3: Mark allocation: Second-year modules](image)

When considering the third-year modules, 15 questionnaires were returned in which the exam papers of third-year modules had been analysed. There seems to be a shift in emphasis at the third-year level (Figure 4) when compared to the second-year level.
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*Evaluation* scored the highest (23.60%), followed by *Understanding* (18.33%), and then *Analysis* (with 18.07%). *Remember* scored 12.67 per cent and *Synthesise and Create* the lowest with a score of 11.60 per cent. However, in eight of the fifteen questionnaires the assessments still focused on lower level cognitive abilities.

![Figure 4: Mark allocation: Third-year level](image)

What became clear was that all the modules (in different academic years) in some departments focused on higher cognitive levels in the assessments, whilst in other departments the focus was mainly on lower levels. Tables 4 and 5 contain evidence of that.

**Table 4: Scores of three modules in Department X (different lecturers)**

<table>
<thead>
<tr>
<th>Department Y</th>
<th>Levels of the cognitive domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1, 1st year</td>
<td>R 0</td>
</tr>
<tr>
<td>Module 2, 3rd year</td>
<td>R 0</td>
</tr>
<tr>
<td>Module 3, 3rd year</td>
<td>R 0</td>
</tr>
</tbody>
</table>

**Table 5: Scores of three modules in Department Y (different lecturers)**

<table>
<thead>
<tr>
<th>Department Y</th>
<th>Levels of the cognitive domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1, 1st year</td>
<td>R 46</td>
</tr>
<tr>
<td>Module 2, 2nd year</td>
<td>R 10</td>
</tr>
<tr>
<td>Module 3, 3rd year</td>
<td>R 6</td>
</tr>
</tbody>
</table>
Post-graduate modules

The participating staff members teaching post-graduate modules taught modules in honours programmes and coursework modules in advanced diploma and master’s programmes. Thirteen questionnaires in this category were processed. In this category there was a tendency to assess more on higher cognitive levels, albeit a large percentage of the marks were still allocated to understanding and application. The average mark allocation per level of cognitive domain is depicted in Table 6.

<table>
<thead>
<tr>
<th>Cognitive level</th>
<th>R</th>
<th>U</th>
<th>Ap</th>
<th>An</th>
<th>S&amp;C</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average mark allocation (%)</td>
<td>6</td>
<td>17</td>
<td>21</td>
<td>15</td>
<td>16</td>
<td>25</td>
</tr>
</tbody>
</table>

**FINDINGS**

The major finding was that assessments in most of these modules did not focus sufficiently on higher level cognitive skills to ensure that the students become deep learners. Deep learning occurs when students are able to consider information or ideas from different viewpoints to solve problems, use decision-making skills to arrive at conclusions, can make applications in varying contexts, and use initiative to explore new knowledge (Killen 2010, 20). To do this, students have to use the evaluative and creative (or analysis and synthesis) cognitive functions which form the highest levels of the taxonomy of learning. Table 7 shows clearly that especially the level of synthesis and creativity (S&C) received very little attention in the assessments.

<table>
<thead>
<tr>
<th>Cognitive domain</th>
<th>Emphasis in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>16.03</td>
</tr>
<tr>
<td>Understand</td>
<td>23.36</td>
</tr>
<tr>
<td>Apply</td>
<td>16.41</td>
</tr>
<tr>
<td>Analyse</td>
<td>15.22</td>
</tr>
<tr>
<td>Synthesise &amp; Create</td>
<td>11.54</td>
</tr>
<tr>
<td>Evaluate</td>
<td>17.45</td>
</tr>
</tbody>
</table>

A somewhat disconcerting aspect that came to the fore when the memoranda/rubrics were compared with the completed questionnaires was that it seemed that lecturers did their analyses of the instruments merely based on what they thought the action words in the papers implied, and not truly on the cognitive level at which a student would have to operate to be able to answer the question. So, for example, a
question requested of students to provide examples, and the lecturer indicated on the blueprint that it was an item requiring students to be able to apply. However, from the memorandum it was obvious that the lecturer had expected of the students merely to repeat examples that had been given in the text book; thus, it was obvious that the students had to apply their memory skills and not really their application skill. During discussions with academic staff during staff development sessions some revealed that their testing of students mostly at lower cognitive levels had to do with their eagerness to ‘cover the content’. They seemed not to teach students various skills to help them create knowledge and make meaning of information, and then trust them to master the content themselves.

In looking for reasons why some lecturers tended to set examination papers that tested students’ higher cognitive skills, it was found that most of those staff members or the head of that particular department took a keen interest in educational matters and attended informal and/or formal educational development courses and sessions on a regular basis. In this Faculty a formal structured short learning programme in the assessment of student learning is offered by the teaching-learning manager. Although this did not form part of the data collection for this project, it became clear that staff members who had attended this course in general set examination papers that complied with the criteria for assessments, namely reliability, validity, feasibility/practicability and fairness, and that compelled students to apply higher cognitive levels in responding to the questions.

CONCLUSION AND RECOMMENDATIONS

The main conclusion based on the findings of the survey is that lecturers tend to put too much emphasis on the lower cognitive levels in their assessments. This survey showed that the students, to a large extent, were not compelled to engage in higher order thinking, that is, the type of cognitive processing that will require complex, contextualised thinking to construct meaning and create knowledge from information. It is common knowledge in higher education that ‘assessment drives learning’. Students tend to learn in the way they know, or think, they will be assessed. Therefore, to ensure that deep, meaningful learning takes place assessments must be geared to assess students at the higher cognitive levels.

It is recommended that all academic staff at higher education institutions should take note of the cognitive levels at which it is expected of students to operate in higher education. Merely covering content, memorising and regurgitating meaningless facts, and never having to apply the higher cognitive levels of critical thinking, decision-making based on analysis, synthesis where different elements are combined to form a new whole (creation) and the ability to evaluate in order to be able to apply knowledge in various contexts will not prepare our students for working in the real world. Assessors should use concrete action words in their assessment items that describe what students can do once they have mastered the outcomes (Suski 2004, 78–9); therefore the formulation of clear learning outcomes is essential.
Teaching staff members should realise that albeit they are masters of their disciplines, to become good lecturers they also have to undergo training in teaching, learning and assessment, and stay informed of innovations and trends in education by attending professional academic staff development activities.

REFERENCES


SAQA, *see* South African Qualifications Authority.

