

TEFP1001

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Questioning the use of Bloom's taxonomy in the maths classroom

1. Summary

Our TEF was under the title "Questioning The Use of Bloom's Taxonomy" and looked at how higher order questions could be used in mathematics lessons in order to improve teaching and learning and allow for differentiation. We researched in to what level of questioning was already used in maths lessons at Thomas Deacon Academy. This took the format of lesson observations and discussions with staff. It was found that the majority of questions that took place in lessons involved lower order thinking skills.

A group of 6 staff then worked on creating questions at all levels of Bloom's Taxonomy for a section of the mathematics GCSE syllabus. We also created sample lessons that involved questions and activities based on questions for staff to use as samples. We asked staff to teach using these lessons and to complete a feedback form on what impact this had on teaching and learning. This was then discussed at a further staff meeting. Staff were able to see the benefit of including these types of activities. We also shared our booklet of questions for the GCSE syllabus, Unit 2 (for Edexcel SOW) so that staff could use these as a basis to create future lessons.

2. Research aims

We wanted to find out what levels of questioning were used in our classrooms and work on improving this. Our main aim was to improve teaching and learning by encouraging staff to include questions and activities that encourages higher order thinking.

3. Context

We were aware from previous observation feedback that questioning was an area of development within the department and wanted to find out whether, by concentrating on Bloom's taxonomy, we could provide staff with tools to improve this area of their teaching. Some members of the department had had some general training on Bloom's taxonomy but not specifically aimed at maths, and as such we were interested in finding out the best way to apply this to maths teaching and learning.

4. Your research approach

Our work took place both at school, and at staff members' homes. We started our work with a meeting at school so that we could each have access to a computer and the internet. Here we researched in to what Bloom's taxonomy was and whether there already existed any guidance on how it could be used in mathematics. We did this so that we were not just repeating work that we could find already completed, but rather to build on current knowledge.

It was important to us that our work also built on current practice within the mathematics department. As such we observed lessons and matched up questions asked to levels of Blooms. In a further meeting at school we looked at this data and used it to guide our next steps. Future meetings took place at group member's homes in small groups of 2, 3 or 4. In these we created a booklet of questions and sample lessons. The last stage of the research took place back in the classroom with teachers in the department (other than those who were part of the research group) teaching sample lessons and feeding back to all maths staff. This was so that we could see the impact of our work and also know how to continue it when the project was finished. Our only issue was that we were taking teachers out of lessons in order to work on this project which could be seen as not in the best interest of the students. In order to deal with this we used large chunks of time (full days) to work together, working later than the normal school day. We choose time carefully to ensure that the same classes were not missing out each time, and paired teachers carefully in order to make use of PPA time effectively.

5. What happened?

Initial research

When we looked online for existing examples of Bloom's taxonomy in mathematics we found a limited number of examples. We found a lot of information on Blooms, and in particular the revised Bloom's taxonomy that we had not heard of before. We used the revised taxonomy from this point as we felt that it suited our staff better. We found a small number of examples of questions at the websites http://www.is93.org/blooms_math.htm and <http://www.kurwongbss.eq.edu.au/thinking/Bloom/blooms.htm>. The second example had the questions in activity format rather than a straight forward question and answer. This started to change the way we thought of "questioning" and led us to thinking more about activities based on questions rather than something that could be asked and answered with the teacher at the front of the class.

From completing our observations of teaching, and after conversations with staff we found that staff asked very basic questions which generally covered lower order questioning only.

Our next step was to meet in small groups to put together a [booklet of example questions](#). While doing this the teachers involved (which included teachers who had specific targets of improving their questioning techniques) found that their own questioning in the classroom changed even without planning for it. They were asking more open and higher order questions. A PGCE student who joined the group was observed after a day of working on the project, and was told that her questioning style had changed completely (for the better!) which had come naturally and hadn't been something that she had thought about.

We put together some sample lessons for upcoming topics on [Standard Form](#) and [Shapes and Angles](#), which involved activities based on questions at all levels of Bloom's taxonomy. We were able to use the booklet of questions to easily plan the

lessons. We then asked staff to trial these lessons and feedback to us. The feedback we had was very positive and it was found that by introducing the higher order thinking, teaching and learning was improved.

6. What have you and your colleagues learned from the project, in relation to your focus and more generally?

One of the first things that we learnt was about how Blooms had developed to the revised taxonomy. A minority of the group had received prior training on Blooms, however it was the original taxonomy. Others in the group had had no experience at all in Blooms and they learnt very quickly how it could be used to guide questioning and activities for students' learning. We had an interesting discussion on whether the higher order thinking was suitable only for higher ability students and were quickly able to show with examples that this is not the case.

By thinking carefully about the increasing orders of thinking in Blooms we were able to see how lessons could include a variety of activities to suit the different levels. We have TAs that have teaching responsibility for some lessons within our department and our working group included two of these. They have said that with no previous training on teaching, their lessons tended to be based on them teaching a topic and students completing questions on this. They stated that their lessons only ever included questions at a maximum level of applying. From working on the project they have stated that they now feel confident to put activities in to lessons that require students to think at higher levels.

By providing staff with a booklet of questions to use for a unit of the GCSE, we have allowed them to start using higher order thinking without having to spend a huge amount of time planning. Creating the sample lessons has allowed staff to see how questions can be taken from the booklet and translated in to learning activities. They have also now got an example to refer back to. Members of the department not involved in the project have commented on how useful they have found this booklet and the fact that using it has allowed them to think of questions for themselves in other areas and at other key stages.

7. Impact

The work completed by our working group had had a major impact on the teaching of those in the group and the learning of their students. As mentioned earlier, teachers have been observed as having better questioning skills as well as feeling for themselves that this has improved. Feedback from the sample lessons has shown that teachers have found that by considering the levels of questioning used, students learning is improved. They also found that students were more focussed and engaged in their work. Teachers felt that this was particularly important in light of the 90 minute lessons that are taught at our academy.

An ongoing aim of our department it to build up exemplar lessons which will be available for all topics at all Key Stages so that staff have a basis on which to plan their lessons. As a result of our project these exemplar lessons will now include references to levels of Blooms so that staff can choose carefully which activities to include as well as becoming more familiar with the Bloom's levels.

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As a result of the work completed we have members of the department not in our working group who would like to be involved in creating similar booklets of questions and exemplar lessons for other topics.

8. Advice to teachers who may want to try something similar:

Do not under estimate how time consuming and mentally taxing it is to spend time thinking! Ensure that you have a realistic idea of what you will be able to achieve in any given session.

If your project spans over the summer holidays have plans in place before the summer holidays for what will happen afterwards. We lost time by not doing this.