

‘What teaching techniques help a student learn a new topic?’

A project to divulge which teaching techniques enable students to learn a new topic

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Methodology:

We were first presented with the headline question “how do students learn best?”, upon which we devised a sub-question based on the impact teaching techniques can have when students are faced with learning a new topic. In order to construct these teaching techniques, we thought it was best to allow a sample of students to form them, as the appropriate teaching techniques that we would have formulated, would not have been an accurate representation of the entire school.

Firstly, we chose a sample size and the group that gave us enough data to analyse which teaching techniques were most effective in enhancing the learning of unfamiliar topics. This consisted of the year groups 7, 9 and 11 with six students, of varying ability, from each year group. This gave us a total sample size of 18 students. Although we knew it would be difficult to get an accurate representation of the views of the entire sample within the school, we felt that by using a diverse range of students through their gender and academic ability, we could capture the similar ideas students may have. An alternative would have been to use students across all year groups but we felt that this would have provided data similar to that of the year above and below them.

We then decided that the best form of data collection was a spider diagram due to the low number of restrictions placed on the data entry for the students. We then used a 'High Five' system which consisted of rating the 15 most frequently appearing teaching techniques from 1 through to 5, in order to provide us with an inclination as to whether certain teaching techniques were more helpful than others. Lastly, we decided that the data would be presented in a Wordle format, whereby the 15 teaching techniques used in the High Fives activity would be transcribed as words in the shape of a hand, to give a visual representation of the data. The restrictions with using the ‘High Fives’ activity was that a very few number of teaching techniques didn’t get transcribed from the spider diagram as they did not appear frequently enough with the sample, but there is the possibility that these techniques may have been popular amongst other students. However we made normative judgements, whereby the more conventional teaching techniques could be rated by students as this serves as the best way to recommend on whether certain teaching techniques shouldn’t be used or used more often.

The next stage of our methodology was to collect the data necessary to progress the project. This included giving the spider diagrams to each year group (in reverse numerical order due the student's circumstances - i.e. Year 11 students partaking in study leave from the beginning of May) whereby they spent a morning registration period to think about the given question ('what helps students to learn something new?') and write down their ideas. Once all spider diagrams were complete, we then went on to transfer the data on to our High Fives Activity, one of which is shown below. This involved using the most frequent teaching techniques that students in each year group felt were

most important when learning a new topic, and placing them in a column followed by a rating from 1 to 5 beside each technique, allowing the students to think about which teaching techniques helped them personally. The constraints of using the 'High Fives' activity is that the students did not have the opportunity to justify their decision on each rating, however the rating itself would give a broad indication as to why a certain teaching technique was rated as it was.

What teaching techniques help you to learn something new?

Please circle the appropriate rating (1 – 5) on how important the following techniques are in helping you to learn a new topic best.

Teaching methods	Rating (1 = important; 5 = not at all important)				
1 Writing down notes either from a presentation or textbook (no discussion)	1	2	3	4	5
2 Class discussion with teachers on specific subject areas	1	2	3	4	5
3 Discussion of notes in small groups (group work)	1	2	3	4	5
4 Mnemonics (memory enhancing techniques – eg: using acronyms)	1	2	3	4	5
5 Computer-oriented lessons (in ICT lessons)	1	2	3	4	5
6 Traffic lights (with planners)	1	2	3	4	5
7 Puzzles to better understanding (crosswords, word searches etc.)	1	2	3	4	5
8 Starter activities (eg: to test definitions at the start of a lesson)	1	2	3	4	5
9 Flashcard-based learning (ie: creating revision notes in lessons)	1	2	3	4	5
10 Interactive games to enhance learning	1	2	3	4	5
11 Revision and test on key points from each lesson	1	2	3	4	5
12 Video-based learning (eg: a movie adaptation of a book being read in class)	1	2	3	4	5
13 Exam paper practise (questions from past papers)	1	2	3	4	5
14 'No-hands up' teaching (students are picked at random to answer questions)	1	2	3	4	5
15 Whiteboard lesson (teachers asking questions and students answer on whiteboards)	1	2	3	4	5

Name: _____

(This will be kept confidential in all subsequent documents produced from these results)

The High Fives Activity used for Year 11 students, asking them to rate various teaching techniques

Rationale:

The rationale for the entire project was centred around the idea that learning a new topic is essential to a student's progress through their academic career. The learning of a new topic in any subject acts as the basis for a student to develop their understanding of the subject content in the future. It is the foundations of learning that we were interested in and we therefore took up the investigation to see how learning a new topic is enhanced through different teaching techniques.

The rationale for choosing a sample size of 18 students was based around the idea that the more varied the sample was, the broader understanding we would receive over learning a new topic. Therefore, we chose to use students of varying ability, as well as gender, which meant that we had three bands of varying ability, with 1 male and 1 female student in each band, which totalled 6 students in each year group. We then decided to use the year groups 7, 9 and 11, as they provided us with three different stages of learning; those who are entering the school, those who are preparing for GCSE content, and those who are finishing their GCSE content. This allowed us to have a sufficient level of data, whilst also ensuring that our investigation approaches a sufficient number of students within the school.

In addition, we chose to use a spider diagram to collect the data, because it serves no restriction to what the student can include, whilst also being a familiar form of data-entry for the students, thus enabling a large amount of data to be collected on one focus point. In order to then divulge which of the techniques noted were the most important, we then used a 'High Five' activity whereby students

rate each of the teaching techniques they placed on the earlier spider diagrams. Our rationale behind the activity was to have numerical data that was easy to compare and subsequently see which techniques are the most effective for the students themselves when learning a new topic. The activity also allows us to form recommendations to those concerned, about how to teach new topics to students. Lastly, we chose to present the data in a Wordle format (pictured below) so that a visual representation of the teaching techniques could be displayed, whilst also highlighting the key techniques that teachers should use.



The 'High Five' Wordle compiled from responses of Year 11 students

Lastly, the rationale for our method of data collection was to collect the data in the most efficient manner whilst also factoring in the circumstances the sample faced. The data collection for Year 11 students was completed first, as they were due to go on study leave, thus limiting their availability for data collection to before early-May. We then collected data for students in year 7 and 9 in the same manner, whereby, in morning registration (as the students were unlikely to have any other commitment during this time) we would give them the spider diagram to fill out, and once this data was collected and transcribed into the High Fives Activity, the activity was then given to the same students as a follow up in the next available morning registration.

Data analysis:

The data we had available for analysis, for all the students in the sample, included the spider diagrams detailing what teaching techniques, in general, were helpful when a student has to learn a new topic and the subsequent high five activity that refined these teaching techniques into a simple rating system, which gave us numerical data to analyse.

Whilst it was always likely that students from the lower school would have similar answers due to being in the same class for all subjects, it was interesting to note the differences in answers based on the student's gender. Whilst the male year 7 students preferred interactive teaching techniques, involving class discussions, group work and answering questions on little whiteboards, the female year 7 students, whilst also including similar answers, also included various methods which enhance a student's learning, for example using worksheets and quizzes to test the student's ability in any given subject, whilst also mentioning the use of experiments or practical work in order to understand the foundations of a subject.

When observing the 'High Fives' activity data for year 7 students, it became clear that practical work was rated very highly amongst all the students with answers ranging between 1 and 2 on a scale from 1 to 5 (with 1 meaning the teaching technique was very important for the sample when learning a new topic; 5 meaning the technique is not important in the student's view). From this, it can be suggested that students feel developing the foundations of a subject can be built using practical teaching methods (for example acting a scene from a play to understand the various elements of it) and subsequently it is also very important when learning a new topic. It was also clear that one of the lowest ranked teaching methods was the traffic lights system used through the student planners. This method is usually used to give an indication of how well students understand a topic and whilst this demonstrates to the teacher whether they need to re-teach the topic for better understanding, the year 7 sample felt that it was not a key aspect in learning a new topic as it did not necessarily enhance their learning, consigning this method to scores between 4 or 5; the two lowest scores on the rating system. A method that received a mixed opinion was a lesson based around the use of computers. Whilst the majority of students gave this a rating of 4, one other student gave a rating of 1, suggesting that using the computers for research purposes can help some but not others. However, by going with the majority, a computer-based lesson does not seem to be an appropriate teaching technique when helping a student to learn a new topic.

Students from year 9 were likely to have slightly different answers in comparison to the similarities observed with year 7 students, as year 9 students now tend to have different lessons to each other due to the year group being divided by academic ability. However, there were still evident comparisons to be made between each gender, whereby the male students mentioned that the conventional teaching techniques were helpful when learning a new topic. This included examples such as making notes from PowerPoint presentations, whereby the note-taking formed a large part of the student's learning regime, as well as doing practise examination questions in order to be prepared for an examination scenario whilst learning the new content. The female students however, felt that the more creative methods of learning are helpful, for example the use of images and diagrams to understand topics and the ability to partake in practical activities (e.g. in science to learn about certain compounds). Both sets of students however, agreed that the teachers

themselves are an important factor for learning a new topic, whereby a caring and helpful nature, as well as being relatable to the students would encourage students to learn a new topic effectively.

When analysing the 'High Fives' activity data for year 9 students, it was clear that one of the highest ranked methods for the sample was to use past examination papers to practise the subject content immediately when learning the new topic. In general, most of the students ranked this technique a 1 and the rest thought it was worthy of a score of 2, suggesting that students were conscientious of their upcoming examinations when completing the 'High Fives' activity. To our surprise, whiteboard lessons were not highly rated with the average score being a 3. We expected this technique to be rated higher than it was because all of the other interactive techniques, for example practical lessons, were rated quite highly. It was also interesting to see the difference in reactions to a 'quite learning atmosphere' whereby some students rated this highly, whilst other students seem to prefer a classroom with discussions. Largely however, the students tended to answer in favour of both a quiet atmosphere as well as a classroom where there are discussions about the topic, suggesting that teachers should employ both techniques systematically to ensure students learn a new topic efficiently.

When analysing the data for year 11 students, there was one common theme that with the spider diagrams the students filled in: PowerPoint presentations. When the students in the sample got older, there was more emphasis on PowerPoint presentations, whereby year 11 students found it helpful to take notes from them due to the concise nature of the information. An explanation for this could be due to the examinations the students have to do, whereby the concentration for year 11 students lies with the many GCSE examinations they have to do (whereby remembering too much content is not feasible when attempting to do well in all the examination being taken), whereas for year 7 students, the onus lies with being as detailed as possible in 'end of year' examination, so to showcase what they have learnt that year, and therefore PowerPoint presentation are too brief to enable them to learn a new topic. Group work was another popular teaching technique with the spider diagrams and amongst the female students, Mnemonics, techniques designed to aid information retention (e.g. the use of acronyms), was a popular teaching technique when learning a new topic.

Year 11 data for the 'High Fives' activity showed that on the whole, making flashcards and revision aids were rated very highly with most of the students giving it the highest rating of 1. This shows that the year 11 students remember subject content in a different manner to that of the younger students who favoured practical work to learn a new topic. Along with the use of PowerPoint presentations, it is evident that year 11 students prefer to refine their examination techniques whilst learning a new topic, perhaps due to their impending GCSE examinations. Furthermore, the year 11 students seemed to think that the traffic light method was not helpful when it came to learning something new and they all awarded it a score of 3 or lower; this was a method preferred more so by the younger students. Lastly, there was a mixed opinion on the use of puzzles to aid the learning of a new topic. Whilst half of the year 11 sample rated it highly, suggesting the need for exercises to test whether a student understands the new topic, others in the sample suggested that class discussions are more important for when learning a new topic. This suggests that whilst further application after the topic has been taught is necessary, the best method for which this is can vary with students – a reasonable expectation as not everybody in the sample were likely to agree with each other.

Implications for Practice:

Our investigation encompassed the foundations of learning and which teaching techniques are most appropriate for which students when faced with learning an entirely new topic. Throughout the investigation we discovered that students have a variety of ideas on how teachers could help them learn a new topic and although this was to be expected, the response we received from the students has allowed us to reach certain conclusions. The intentions of this project were to recommend teaching techniques that, in the views of the students themselves, would help them learn a new topic effectively and efficiently. From the data we collected and analysed, we can recommend the following things for each year group.

Year 7 Recommendation

Using the data collected from both the spider diagram and the 'High Fives' activity, there was a large emphasis that year 7 students react best to practical and interactive activities. It was a common theme arising in the spider diagrams where students alluded to the usage of experiments in science lessons in particular. This applies to both genders, as the entire year 7 sample rated group discussions as "important" with ratings between 1 and 3.

Another recommendation of ours however is for teaching staff to put less emphasis on quizzes and the use of the traffic light system in the student planners. With reference to past experience and the data collected from students, the use of wordsearches and crosswords are not important when attempting to learn a new topic. Whilst this does not include when students are recapping a topic, it is important to note that students find this teaching method less useful than the others as evident from the poor ratings it received from the majority of the year 7 sample.

Lastly, our third recommendation for the teaching staff of students in year 7 arises again from both sets of data, whereby students, females in particular, learn well with the use of Mnemonics to aid the retention of information from a new topic. Mnemonics is a teaching technique whereby memorable activities are used to learn the subject content, for example using songs or acronyms. We would therefore encourage teaching staff to spend time to incorporate information retention techniques into their lesson plans in order for students in year 7 to learn topics efficiently

Year 9 Recommendation

An initial observation of ours was the reference the year 9 sample made to the learning environment in which they worked in. Whilst half of the sample were in favour of a quiet learning environment to aid the retention of new information being taught in the subject, the other half of the sample were in favour of class discussions in order to develop the knowledge the students had just learnt. This therefore has led us to make the recommendation that the teaching staff should be encouraged to have different learning environments when teaching new topics to their students. Whilst it is suitable to have a quiet working condition should the work permit high levels of concentration, teachers should also be aware of the advantages of having discussions so that the students can develop their own understanding of a topic, which is particularly important for a new subject area.

Whilst this project aims to highlight areas for change in various teaching styles, it is also important to consider the teachers themselves, whereby the year 9 sample specifically pointed out that a teacher who is caring yet knowledgeable about the subject and is willing to help is important, as the students felt encouraged to learn when the teacher promoted such actions through their own behaviour.

Whilst note-taking was promoted amongst the year 9 samples, when they are in a position of not understanding the notes on the PowerPoint presentations, it is important to encourage the teaching staff to relate to the student and explain it in a personal manner to each individual student so that they are knowledgeable about the new topic learnt in the subject.

Lastly, the two recommendations that has arisen from the 'High Fives' activity for year 9 students include the extensive use of past paper questions and the lesser usages of little whiteboards for answering questions posed by the teacher. Firstly, it was stressed that the use of examination questions is important when learning a new topic rather than solely before an impending examination as this ensures the students become comfortable with the new subject content in the format they would expect to see it in an examination. In addition, the entire year 9 sample stated that the use of whiteboards in lessons was not an effective teaching technique as it did not aid, to a great extent, the student's ability to answer a similar question correctly the following time.

Year 11 Recommendation

With year 11 students, as expected, there was more of an onus on examination results as they were in their final year of GCSE examinations and were already aware of their performance in previous examination following the publication of their January module results. When collecting the data, the students were also aware of the number of examinations they had in the summer examination period and subsequently realised the importance of having condensed notes in order to perform well in as many of their examinations as possible. This therefore had led to the recommendation for teachers to either continue, or use more if not already, PowerPoint presentations so that students are able to have bullet point notes on new topics and elaborate on them should the need arise.

Another recommendation for the teaching staff of year 11 students, would be to encourage students to make flashcards and revision aids (such as Mnemonics) so to aid the information retention of new subject content. This was rated highly on the 'High Fives' activity and we would therefore recommend the teaching staff of year 11 students to set aside a lesson whilst the students are learning a new topic, for the producing of revision materials as it not only allows students to learn efficiently, it also aids their revision in the future.

Our last recommendation arises again from the 'High Fives' activity whereby half of the sample stated the use of puzzles enabled them to learn a new subject topic, whilst others alluded to the use of class discussions. The difference in opinions was to be expected amongst students and we would therefore recommend that in a classroom comprising of mainly male students, puzzles (such as wordsearches and crosswords) should be used, whereas with female year 11 students, they learn a new topic better when discussing the subject area – an idea that is not objected to by the remaining year 11 sample. In a mixed classroom therefore, we would therefore recommend the usage of class discussions to help the students learn a new topic with the inclusion of a few puzzles to enable the testing of the new subject content learnt.