Does the Undergraduate Ambassador Scheme Enhance the Learning of Undergraduate UAS Participants and School Pupils?

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Abstract

The University of Nottingham's Bioscience Department joined the Undergraduate Ambassador Scheme in 2007. The scheme provides undergraduate students with the opportunity to act as 'Ambassadors' for their own subject discipline in local schools. The Bioscience UAS Project is 40-credit final year project, which consists of a Literature Review, School Placement and Dissertation. The aims of the project are to evaluate the effectiveness of the UAS in general, and the Bioscience UAS in particular, in terms of enhancing the learning of school pupils and of UAS participants and finally through reflective learning the Bioscience Undergraduate will evaluate their experiences, in relation to the overall project.

The Literature Review consists of an introduction to the UAS, a review of learning and teaching theories and critical evaluation of evidence that the UAS and similar schemes enhance learning experiences. A substantial school placement was conducted with support from a mentor. Classroom activities included observational sessions, classroom assistance and teaching. Lessons were planned in line with the National Curriculum Framework. Teaching resources were based upon the host school's own lesson plans and other reliable sources. Analysis of the engagement between school pupils and the UAS Student was conducted using teacher testimonials, classroom observation and a pupil questionnaire. The UAS participant kept a weekly journal to facilitate reflection on their experiences throughout the project.

The results show some learning benefits both for school pupils *and* for UAS participants. However, the project's conclusions are presented with a number of reservations about the quantitative and qualitative techniques used here and in similar studies. More rigorous long-term evaluation is needed to convincingly demonstrate the educational benefits of the UAS. By reflecting on experiences throughout the project the UAS participant recognised changes in their views and opinions and improvement in transferable skills.

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CHAPTER 1: LITERATURE REVIEW

1.1 Undergraduate Ambassador Scheme

The Undergraduate Ambassador Scheme (UAS) provides undergraduates with an opportunity to undertake a formal, credit-bearing unit of study in which they become an 'ambassador' for their own subject discipline (Cooper and D'Inverno, 2005) while working on placement in a local school[1].

The scheme was founded by Simon Singh and Hugh Mason[2] in 2002. They set up the scheme because of growing concern over teacher shortages and the reduction of university applications in Science, Technology, Engineering and Mathematics (STEM) subject areas. They anticipated that placing undergraduates in school classrooms in this way would help raise the profile of these subjects[3].

Maths and Physics departments at King's College London, The University of Surrey and University of Southampton were the first to participate in the scheme but it has since extended to a range of other higher education (H.E.) subject areas including Biology, Chemistry, Music, Geology, Computer Sciences and the Biosciences[4]. In the UAS's first year, just four university departments and 28 undergraduates were involved in the scheme. However, expansion has been rapid and currently 300 schools and 40 universities (2007) in the UK and Ireland are participating. A list of participating schools and universities can be found online at: http://www.uas.ac.uk/participants_home.php?id=135 [Accessed 26th February].

Currently, the UAS organisation provides support to university departments with administration and setting up the scheme[1]. However, Hugh Mason co-founder of UAS says the hope for the future is that the scheme will become sustainable without the need for the original UAS organisation, as long-term connections are made between universities and local schools[3].

[1] Undergraduate Ambassador Scheme http://www.uas.ac.uk/about.php?id=142 [Accessed 5th April, 2008]
[2] Undergraduate Ambassador Scheme http://www.uas.ac.uk/about.php?id=108 [Accessed 5th April, 2008]
[3] Undergraduate Ambassador Scheme http://www.uas.ac.uk/about.php?id=143 [Accessed 5th April, 2008]
[4] Undergraduate Ambassador Scheme http://www.uas.ac.uk/about.php?id=144 [Accessed 5th April, 2008]

1.1.1 Funding the Undergraduate Ambassador Scheme

The UAS is funded by the Teacher Training Agency (TTA)[5]. In addition the UAS is approved by several professional bodies[6], who believe the scheme offers a positive contribution to the educational experience, including:

- Institute of Physics
- Royal Society of Chemistry
- The Royal Society
- The Institute of Structural Engineers
- Academic Staff at Universities
- School Teachers

In January 2007 a press release from the Royal Society of Chemistry (RSC) announced that the RSC were to support UAS by awarding the scheme £40,000, over a two year period. This investment was intended to boost the number of chemistry departments offering the UAS scheme to their undergraduates. David Alker, Chairman of the RSC, comments that there is a need for next-generation chemists and science teachers[7]. Clearly adequate funding is essential to the UAS's success; however, if the scheme is to attract support from professional bodies and government agencies, then reliable and consistent evidence of its effectiveness will need to be produced.

1.1.2 The School Placement

The UAS provides the opportunity for undergraduates to work with learners from a range of age groups, from reception pupils through to mature students[8]. Participants are expected to spend 3-4 hours per week involved in classroom activities over a period of 10-12 weeks. Prior to the commencement of the school placement, training is given to prepare the participant for the experience of working in a school[9]. Each participant is paired with a teacher who will act as their mentor throughout the placement. It is envisaged that UAS students will have the opportunity to work with a number of teachers over this time, though this is not

[5]Undergraduate Ambassador Scheme http://www.uas.ac.uk/news_story.php?id=218 [Accessed 6th April, 2008]
[6] Undergraduate Ambassador Scheme http://www.uas.ac.uk/news_story.php?id=219 [Accessed 22nd April, 2008]
[7] Royal Society of Chemistry http://www.rsc.org/AboutUs/News/PressReleases/2007/undergraduateambassadors.asp [Accessed 6th, April 2008]
[8] Undergraduate Ambassador Scheme http://www.uas.ac.uk/about.php?id=144 [Accessed 5th April, 2008]
[9] Undergraduate Ambassador Scheme http://www.uas.ac.uk/undergraduates.php?id=132 [Accessed 6th, April 2008]

prescriptive. Ultimately working arrangements will be determined through negotiation between participants and the host school[10].

Credit awarded for the UAS placement module can vary between 10 and 40 credits; this and the assessment method are decided by the participating university. However, UAS students are required to keep a weekly learning journal throughout the placement, as well as producing a reflective report and presentation about their experiences afterwards.

1.1.3 Aims of the Undergraduate Ambassador Scheme

The UAS aims benefit all participants in the scheme – undergraduates, teachers, pupils and universities (see Table 1.1)

Undergraduates:
1. Gain practical and transferable skills valued by graduate employers, including: communication, presentation, team-working, active listening, time management and prioritisation 2. Through the process of teaching pupils in the classroom they would learn how to communicate subject 3. Strengthen and improve own subject knowledge 4. Gives an insight into teaching as a career 5. Gain valuable classroom experience to support teacher training applications[11]
Teachers:
1. Will gain support from someone knowledgeable and enthusiastic about their subject 2. Will gain support in the classroom e.g. individual work with brighter pupils/ struggling pupils and help to run science clubs 3. Increase in teachers subject knowledge[12]

[10] Undergraduate Ambassador Scheme http://www.uas.ac.uk/about.php?id=142 [Accessed 5th April, 2008]
[11] Undergraduate Ambassador Scheme http://www.uas.ac.uk/undergraduates.php?id=132 [Accessed 6th, April 2008]
[12] Undergraduate Ambassador Scheme http://www.uas.ac.uk/schools.php?id=151 [Accessed 6th, April 2008]

Pupils:
1. Undergraduates in classrooms who are passionate and knowledgeable about their subjects 2. More individual attention 3. University undergraduate in their classroom acting as a role model 4. Raise Aspirations[13]
Universities:
1. Long term benefits from developing links with local schools 2. Possible boost in applicants especially in science subjects[14]

Table 1.1: Aims of the Undergraduate Ambassador Scheme

1.2 Bioscience UAS Project

The University of Nottingham's School of Biosciences applied to join the UAS in 2006. The Bioscience UAS runs in two stages: i) students who participate in the scheme must complete the prerequisite module (Communicating Bioscience - D224E2) that runs in Semester 4; ii) students in the final year of their degree take part in a 40-credit year-long project (Bioscience UAS project), which is equivalent to a bioscience project. The project consists of a Literature Review, a UAS School Placement and retrospective (discussion section).

1.2.1 Aims of the Bioscience UAS

The aims of the Bioscience UAS fall within the aims of the overall UAS scheme. However, more specifically they are (see Table 1.2):

Bioscience Undergraduate Ambassador Scheme Aims are:

[13] Undergraduate Ambassador Scheme http://www.uas.ac.uk/schools.php?id=165[Accessed 6th, April 2008]
[14] Undergraduate Ambassador Scheme http://www.uas.ac.uk/universities.php?id=126 [Accessed 6th, April 2008]

1. To raise awareness of, and increase interest in, the bioscience subjects among school pupils
2. To improve undergraduates' knowledge of their own bioscience subject through communicating it to others
3. To improve links between university science departments and local schools
4. To raise school pupils' aspirations in line with 'Bioscience Widening Participation' guidelines (CR Section 1.4.4)
5. Provide undergraduates with key transferable skills that will apply to future careers in the bioscience vocations
6. To boost the number of pupils applying to study bioscience subjects in H.E.

Table 1.2: Aims of the Bioscience Undergraduate Ambassador Scheme

1.2.2 Bioscience UAS and the School Placement

In primary and secondary schools the study of living organisms is taught under the heading of Biology. It is not until Further Education (F.E.) or H.E. that biosciences are taught as individual disciplines: biochemistry, pharmacology, ecology etc[15]. Therefore, during the school placement it is likely that the Bioscience participants (BP) will be primarily supporting the delivery of the Science National Curriculum or other subjects where appropriate.

1.3 Bioscience UAS and Learning and Teaching

The UK is a leading country in biosciences research and development. This is of major importance to the country in terms of health and finance. It is essential, therefore that capable young people enter careers in the biosciences. At present, there are a several areas of concerns regarding biosciences education:

- School biology lessons are outdated in terms of both content and teaching methods
- School pupils are unaware of how bioscience subjects link with related vocations

[15] Biosciences Federation (2005) http://www.bsf.ac.uk/responses/Enthusing.pdf [Accessed 12th April, 2005] p.2,4

- Universities are struggling to recruit students to the core bioscience disciplines[16].

The *Beyond 2000* report concludes that bioscience teaching in schools needs to change in light of both of new discoveries about the natural and technical world, and of developments in learning and teaching. The report notes that much bioscience teaching is underpinned by theories that were developed almost a century ago[17].

Bioscience UAS participants may be able to address some of these areas while on their school placements. It will be necessary to develop different communication strategies within the context of different learning groups.

The subsequent sections review a selection of learning theories/strategies used in schools and universities and considers their implications for teaching.

1.3.1 Learning and Teaching Theories

There has been considerable research into educational theories (Reece & Walker, 2007). Early research by cognitive and behaviourist psychologists was limited as it only addressed behavioural outcomes that could be measured objectively. However, more recent studies conducted by researches such as Honey and Mumford, suggest that individuals learn in *different* ways (Beech *et al.,* 2002). For this reason no single theory can offer a complete explanation. Furthermore, everything that teachers teach will be consequence of the theories that they, consciously or unconsciously, adopt (Bigge & Shermis, 1998).

The following sub-sections review and compare the two main systematic theories of the 20th Century, Behaviorism and Cognitive Psychology (Bigge & Shermis, 1998). The contemporary theory Constructivism will also be examined.

1.3.1.1 Behaviourism

Early Behavourists believed that learning can be defined as an observable change in the behaviour of an organism. They supposed that learning takes place through the relationship between a stimulus (e.g. teaching method) and response (physical

[16] Biosciences Federation (2005) http://www.bsf.ac.uk/responses/Enthusing.pdf [Accessed 12th April, 2005] p.2,4
[17] Beyond 2000 – Teachers of Science Speak Out. http://www.nsta.org/about/positions/beyond2000.aspx [Accessed 4th April, 2008] p.1,2,3

reaction to the stimulus) (S-R) (Bigge & Shermis, 1998). Studies carried out by early psychologist behaviourists such as Pavlov (Reece & Walker, 2007) and J.B. Watson (Bigge & Shermis, 1998) have been criticised because the predictions they made about human behaviour (S-R) were based on animal behavioral studies. Professor B. F. Skinner (1904 - 1990) another behavioural psychologist spent half a century studying the 'learning process' in organisms (Fontana, 1995). Skinner proposed that teaching is instruction in verbal behaviour and that students are not given knowledge by their teacher but they are told what behaviour is required of them, for instance they are told how to use words. Skinner believed that children learn by reinforcement of behaviour (Reece & Walker, 2007). If behaviour is reinforced with a reward (positive reinforcement) or removal of an unpleasant consequence (negative reinforcement) the behaviour is more likely to occur again, this process is termed 'Operant Conditioning' (Fontana, 1995). However, there is disagreement with this view and it is not held by most psychologists (Bigge & Shermis, 1998). In the classroom, teachers can specify the 'behaviour' they want from their pupils and then reinforce the behaviour if it is correct. Teachers should regularly praise children, using quick corrective feedback, so as to reinforce desired behaviour (Kyriacou, 1997). The teacher's role is seen as active and the one that controls the learning. Whereas, pupils provide the response to the stimuli, are seen as the passive learner (Reece & Walker, 2007).

1.3.1.2 Cognitive Psychology

During the last thirty years there has been a great deal of research into the way individuals learn. The research supports the view that all individuals, regardless of age, construct meaning of new concepts by processing and acting upon their experiences in relation to the knowledge they already have[13].

Cognitive psychologists identify learning as having taking place by noting changes *within* the learner, while behaviourists observe changes in behaviour (Beech *et al.,* 2002). Cognitive Psychologists believe that students learn by changing their thought patterns (Bigge & Shermis, 1998), actively shaping and organising them into new meanings. As a result, individuals can interpret information differently, even when the same material has been presented. Therefore, when a new task is started, it is important that any misconceptions are established by the teacher (Kyriacou, 1997) and students are given time to reflect on prior knowledge (Fontana, 1994).

Cognitive Theory could be applied to the classroom by relating the intended learning to the students' personal circumstances, or by giving students the opportunity to lead discussions. Feedback should be given throughout the learning process, not just when the desired response has occurred, as behaviourists advocate (Reece & Walker, 2007).

Jerome. S. Bruner (1915-) studied learning in relation to children and young people throughout his career (Bigge & Shermis, 1998). Bruner suggested that individuals learn by linking incoming information with past experiences and then transforming this into a new understanding. Transformation is linked to three systems that increase in complexity: enactive (action/doing), iconic (diagrams/drawing) and symbolic (explain/verbal). Mature learners are able to use and integrate the whole system, whereas children, depending on their maturity, are limited to the enactive mode (Fontana, 1995). Bruner (1996) considers that by the time the child is able to use the iconic system to understand concepts they have the ability to separate their 'internal' and 'external' (shared by others) experiences. Bruner considers that Skinner's 'operant conditioning' is similar to the way children learn in the enactive mode (Fontana, 1995).

1.3.1.3 Constructivism

Constructivism is linked to cognitive psychology in the respect that the practical focus of teaching should be on *what the learner does* (Biggs, 2003), as opposed to behaviourism which puts the control in the hands of the teacher (Bigge & Shermis, 1998). A systems approach to learning, such as the behaviourist approach, sees the learning activity that the student does as an opportunity for them to prove to the teacher that they have mastered a particular skill. This is based on the assumption that if a concept is taught in a systematic manner, then the learner will ultimately exhibit the desired behaviour, hence learning will have taken place. Constructivists see the student as an *active* learner. A constructivist approach to learning activities at university level might be to present students with a complex activity that the students would be put in control of (Herrington *et al,* 2002). The school teacher, meanwhile, might design appropriate activities for pupils (Reece &Walker, 2007). In both cases, the teacher's role is to guide and support the student through the activity (Herrington *et al*, 2002). Psychologists believe that activities which engage the learner in the learning experience as opposed to passive learning are more likely

to encourage an understanding of the subject (Kyriacou, 1997). When students have completed the task, reflection takes place. Students reflect on their experiences and how they have changed as a result of the activity (Reece & Walker, 2007).

1.3.2 Teaching and Learning Strategies in Schools and Universities

Throughout the last century, psychologists have aimed to develop a theory of learning that will suit all learning groups. However, it is imperative that the context in which learning takes place, such as schools and universities, is taken into account (Biggs, 2003). Children and adults learn differently: pedagogy is about how children learn and andragogy about how adults learn (Reece and Walker, 2007).

1.3.2.1 Schools

The way pupils learn is just as important as the content that they learn (Kyriacou, 1997). When presenting new information pupils need to be actively involved, rather than just being passive learners. However, active learning means more than pupils just doing something, they also need to be cognitively involved, e.g. comparing things and given time to reflect (Moyles, 2007). Active learning promotes a better understanding and improves skills. Furthermore, it has beneficial effects on the pupils' outlook toward the learning process (Kyriacou, 1997).

However, there is debate of which is the best way to teach school pupils. It is argued that the direct teaching methods which include the teacher having the control from start-to-finish of the lesson are better. The lessons incorporate, clear goals being set, questioning to assess learning and a period of supervised practice but these are teacher lead and are not used to provoke discussion within the classroom (Kyriacou, 1995).

1.3.2.2 Teaching and Learning Strategies used in Universities

According to Biggs (2003), serious research into university students' learning began in Sweden in the 1970s. Two educational researches, Saljo and Marton, drew a distinction between 'surface' and 'deep' approaches to learning (Martin & Saljo, 1976).

The surface approach requires only low-level cognitive ability – memorization, rote-learning; students use it strategically to complete learning tasks with a minimum of effort. Deep learning, by contrast, involves the analysis of new ideas in a way that promotes conceptual change: new ideas can be understood, retained and applied to unfamiliar contexts.

The lecture is the conventional technique of teaching used at universities. This method represents a teacher centered approach, where information is transmitted from the lecturer to the students (Ramsden, 2003). The lecture in itself does not prevent individuals from learning in a deep and meaningful way but the only students who will learn from them are the ones that can learn from listening and taking notes. Many students need to reflect on the information through discussion or writing (Herrington *et al*., 2002). However, Ramsden (2003) concludes that lectures can be extremely useful for some situations e.g. introducing new topics and presenting an argument.

If deep learning is to happen, however, students need to make sense of new knowledge through the reflection process (Beech *et al.,* 2002). However, evidence shows that students find reflecting on their work difficult initially. Reflective strategies need the commitment of the teacher. However, this is challenging as the teacher is required to enter into discussion with the student to facilitate the learning process (Thorpe, 2000).

Learning journals are a useful aid to students who need to engage in the reflective learning process during their studies, as it enables them to see how they have changed as a result of the learning process. They are especially useful for assessing knowledge and reflection. However, it is important that the learning journal is not used as just a diary to record events (Biggs, 2003).

1.4 UAS/Similar Schemes and Learning

Student tutoring schemes generally refers to a method of teaching that involves H.E. students teaching school pupils in the classroom under the guidance of a school teacher. The Pimlico Connection (PC), founded in 1975, was the first tutoring scheme of its kind and recruits voluntary science and engineering students from

Imperial College in London[18]. The Student Associates Scheme (SAS) is funded by the Training Development Agency for Schools (TDA) and offers a bursary for student participants[19]. Both the PC and SAS have similar aims and systems to the UAS.

The concept of undergraduate students tutoring school pupils in classrooms is not a new one. In 2002 there were 180 tutoring schemes in the UK. The scale and number of tutoring schemes is not in itself evidence of their effectiveness (Goodlad, 2002)[20]. Goodlad (2002) points out that these schemes will need to produce consistent and reliable evidence that they provide key transferable skills and enhance the learning of student participants and school pupils, if they are to attract government and industry funding in the long-term. It is worth mentioning that all though these schemes are similar they may have different criteria, therefore it is difficult to make comparisons. However, Goodlad states that if similar methods are used to monitor the effectiveness of these schemes they can be compared.

The subsequent sections provide critical evaluation of the aforementioned schemes in relation to the learning experiences of school pupils and students participating in the schemes. Whether undergraduates gain transferable skills on the schemes is explored. Finally this section looks at raising the aspirations of school pupils in relation to encouraging them to study in H.E.

1.4.1 The Literature Search

To access relevant literature on the effectiveness of these and other similar schemes, a detailed electronic literature review was conducted, using the search engines 'Web-of-Knowledge', 'Education Resources Information Center', JSTOR Education', and 'Google Scholar'. However, this was predominantly unsuccessful as only eight papers were found and these were unrelated to the topic. The following search terms were used:

- Student/undergraduate ambassador

[18] Alexandra, A. Evaluating 30 Years' Success of the Pimlico Connection. Accessed on line: http://www3.imperial.ac.uk/portal/pls/portallive/docs/1/7261923.PDF [Accessed 5th April, 2008]
[19] Training and Development Agency for Schools. http://www.tda.gov.uk/partners/recruiting/careerexploration/studentassociates.aspx [Accessed 5thApril, 2008]
[20] Goodlad, S. (2002) Tutoring – the neglected partner? Accessed online: http://www.hementornet.org/downloads/Goodlad_Tutoring.pdf [Accessed 4th April, 2008]

- Student in classrooms
- Student tutors
- Undergraduate tutor/mentor etc...

1.4.2 Do the UAS or Similar Schemes Enhance the Learning of School Pupils?

With the exception of the Pimlico Connection, the UAS and SAS are relatively new; therefore, little research has been undertaken to ascertain their effectiveness. Furthermore, the majority of evidence is anecdotal. However, a limited amount of quantitative data has been obtained about these schemes. In addition research undertaken by Hill & Topping (1995) on student tutors in the UK has been explored.

1.4.2.1 UAS

The UAS conducted evaluation on the scheme in 2004/5 and 2005/6. The aim of the evaluation was to demonstrate the impact that the scheme has on those involved. In 2005/6, 34% (159/464) of the total teachers involved in the UAS responded to a questionnaire. The majority of teachers felt that pupils had been enthused to some extent by the presence of an undergraduate student in the classroom[21] [22].

1.4.2.2 Pimlico Connection

Evaluation of the Pimlico Scheme was carried out during 1979-1991. Pupils who had a Pimlico Student in their classroom during this time were asked a series of questions relating to this. 5629 pupils responded, (68%) of the total cohort. Pupils were asked if the 'amount of learning' and 'interest of lessons' was more, about the same or less. Over 50% of the pupils answered 'more' to both of the questions and less than 5% answered 'less' , with remainder answering 'no change' (Hughes, 1994).

The same study asked *all* teachers who had a student tutor in their classroom, how they thought the 'pupils seemed to learn', more, less or about the same. The response rate was 62% during 1979 – 89 with 69% answering 'more' and 25%

[21] Evaluation of the Undergraduates Ambassador Scheme (2004-5). http://www.uas.ac.uk/news_story.php?id=226 [Accessed 10th December, 2007]
[22] Evaluation of the Undergraduates Ambassador Scheme (2005-6). http://www.uas.ac.uk/news_story.php?id=226 [Accessed 10th December, 2007]

'about the same'. During 1992 – 1993 the response rate was higher and 95% answered 'more'. These results appear to show that more than 50% of pupils and teachers thought that they had benefited from having a student tutor in the classroom. Hughes, (1994) reported that children who have a student tutor in their classroom do at least appear to *try harder.*

However promising the initial data seems, it must be remembered that it is only pupils' and teachers' subjective impressions of the experience that are being recorded; measuring enhanced educational impact is far more difficult. To improve this issue, data control groups might be used to draw comparisons and test for significant findings (Hughes, 1994). However, even here, *correlation does not prove causation*; even where benefits can be demonstrated, UAS cannot be shown to be responsible for these gains. In addition, no distinction has been made between primary school and secondary school pupils. Another potential problem is that the questions asked are ambiguous and therefore could be interpreted in different ways.

1.4.3 Does the UAS or Similar Schemes Enhance the Learning of Undergraduates?

This section reviews the SAS, UAS and PC in relation to enhancing the learning of undergraduates. A study that analysed tutoring schemes in the UK in relation to enhancing cognitive abilities of undergraduates is also evaluated.

1.4.3.1 SAS

The SAS project claims several benefits for the participants in relation to enhancing learning and teaching experiences. For instance, they maintain that students will bring fresh ideas to the classroom, and lead projects in their specialist subject area. However, the scheme has not produced any evidence that this has happened. This scheme is supported by the TDA, which is possibly why evaluation has concentrated on the scheme's role in attracting participants into the teaching profession[23].

1.4.3.2 UAS

[23] Training and Development Agency for Schools. http://www.tda.gov.uk/partners/recruiting/careerexploration/studentassociates.aspx [Accessed 5thApril, 2008]

Cooper & D'Inverno, (2005) carried out evaluation of the UAS scheme in the early stages. Thirteen students were asked to complete a questionnaire about their views on the UAS. They were asked to rate how they had perceived their skills development. The average score was 4.82 out of a possible 5, which seems promising. However, this question could be deemed ambiguous as it is not made clear what is meant by skill development.

1.4.3.3 Pimlico Scheme

In the Pimlico study, students tutors were asked three questions, which could be considered related to learning and teaching, see Table 1.3. There is a marked difference in the responses to these questions. Students claim to have benefited from the chance to improve communication in science. The results in all questions are quite consistent between the different time periods; however a statistical test has not been used. In addition these questions are subjective, so comparisons between respondents cannot confidently be made.

How has the scheme benefited you?	Greatly	Somewhat	Not at all	Not sure
By getting practice in the simple communication of scientific idea?	59 (55)	40 (40)	1 (2)	0 (2)
By reinforcing your knowledge of some aspect of your subject.	8 (4)	38 (38)	52 (55)	1 (3)
By increasing your self confidence	39 (19)	52 (58)	11 (17)	4 (6)

Table 1.3 adapted from table IV (Hughes, 1994). Percentage of students indicating that they had benefited. Number of students that responded to the questionnaire 1979 – 1992 n=1046 (70%) response rate. During 1992-93 (shown in brackets) n= 130 (83%) response rate.

However, in a report by Marshall (2002) it is suggested that whilst quantitative assessment provides the wide picture, qualitative assessment fills in the gaps and adds detail. To properly evaluate student learning, both techniques should be used. Matched control groups could be used to test significantly if the subjective information is true (Lockwood, 2008).

1.4.3.4 Tutor Schemes in the UK

Research conducted by Hill and Topping (1995) aimed to evaluate whether H.E. student tutors (ST) from UK schools had enhanced their cognitive abilities in relation to the tutored subject. In addition, they were asked whether they had improved their transferable skills. The methods used were pre- and post-tutoring questionnaires. Questionnaires for each ST were included in the study if they had completed both the pre and post questionnaire. A total of 358 students (26% of the cohort) completed both questionnaires. There were several significant findings, for example 42% of students thought that their 'confidence in the knowledge of their subject' was higher post-tutoring and 33% thought that their 'understanding of how others learn' was higher post-tutoring. In contrast, 32% thought that their 'awareness of subject facts' was lower and this was statistically significant.

Individual STs may perceive their abilities, such as cognitive abilities, differently than others and therefore rate them at different levels. Therefore the results are subjective. Furthermore, STs may be more realistic about their abilities after the tutoring has taken place because their understanding of what is involved has increased. Interestingly, the results suggest that STs placed in primary schools thought that their transferable skills had improved the most, whereas STs in secondary schools thought that their cognitive ability had improved (Hill & Topping, 1994).

1.4.3 Transferable Skills

Transferable skills include communication with a group, confidence, negotiation skills, planning, and presentation skills. The evaluation of the UAS, 2004/5[24] and 2005/6[25] includes data on participants' perceptions of the scheme's impact on their transferable skills. They were asked if improvements in their skills were 'great', 'moderate' or 'none'. The results for both years are similar for each of the transferable skills. The transferable skills that most participants most improved (answering 'great') were communication with a group, confidence and planning, in

[24] Evaluation of the Undergraduates Ambassador Scheme (2004-5). http://www.uas.ac.uk/news_story.php?id=226 [Accessed 10th December]
[25] Evaluation of the Undergraduates Ambassador Scheme (2005-6). http://www.uas.ac.uk/news_story.php?id=226 [Accessed 10th December]

both years. Participants rated time management and negotiation as the least improved in both years.

In the previous study mentioned by Hill and Topper (1994) there were eight questions asked about improvement in transferable skills. The results were not as positive as in the cognitive abilities. Five out of the eight transferable skills had decreased significantly post-tutoring, such as 'communicating in writing and 'collaboration with others'. However, 'communicating orally' and 'leading others' had increased significantly. Nonetheless there is still a question over the reliability of the statistical analyses.

1.4.4 Raising Aspirations and Widening Participation

The Higher Education Funding Council for England (HEFCE) strategic plan for 2006-11[26] states that: Widening Participation (WP) aims to raise aspirations and educational attainment. The HEFCE fund Aim Higher, a scheme that works in partnership with student mentoring schemes.

'Widening participation aims to broaden the range of students who attend university so that they are representative of the home population' *(*Widening Participation, http://www.nottingham.ac.uk/wideningparticipation/, 2007).

The UAS found that it was making a significant contribution to widening participation WP. During 2005-6 they placed 81 first-generation undergraduates into schools to act as role models. Furthermore, during the same year, 43% (86/198) of participating secondary schools where the attainment level is lower than average, had a STEM student on placement[27]. However, UAS participants were not representative of the school pupils that were being taught in regard to ethnicity and socio-economic status. The majority of student tutors were middle-class, white females (2005/6). This may affect the capacity of the student tutor to act as a role model (Hill and Topping, 1994).

[26] The Higher Education Funding Council for England http://www.hefce.ac.uk/pubs/hefce/2007/07_09/07_09.pdf [Accessed 12th April, 2008]
[27] Evaluation of the Undergraduates Ambassador Scheme (2005-6). http://www.uas.ac.uk/news_story.php?id=226 [Accessed 10th December, 2008]

Pimlico volunteers are encouraged to help raise the aspirations of pupils, especially in the low-achieving schools, and ultimately make H.E. more accessible[28]. A study conduct by Jones (1989) on a similar scheme to the Pimlico, in New Zealand, concluded, that it is difficult to assess whether the schemes are raising aspirations. However, students in classrooms may work alongside several other systems already in place within an institution that aim to raise aspirations.

1.5 Aims and Objectives of the Bioscience UAS Project

Aims

1. To evaluate the effectiveness of the UAS in generally
2. To evaluate the effectiveness of the UAS Bioscience in terms of
    - Enhancement of school pupils' learning
    - Enhancement of Bioscience UAS participant's learning
3. Through reflective learning the Bioscience Undergraduate will evaluate their experiences, relating the overall project

Objectives

1. Conduct a detailed literature review on:
    - the UAS scheme
    - learning and teaching theories in the pedagogical literature
    - the effectiveness of the UAS and similar schemes primarily relating to enhancing the learning experience of school pupils and undergraduate participants
2. Conduct a substantial school placement in a Primary School that will involve:
    - Assist teacher in Classroom Assistant role
    - Develop and deliver Science lessons
    - Provide analysis of pupil engagement with the Bioscience UAS student
3. Critically reflect on own learning and pupils' learning in relation to learning and teaching theories

[28] [28] Alexandra, A. Evaluating 30 Years' Success of the Pimlico Connection. Accessed on line: http://www3.imperial.ac.uk/portal/pls/portallive/docs/1/7261923.PDF [Accessed 5th April, 2008]

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CHAPTER 2: SCHOOL PLACEMENT REPORT

2.1 Training prior to the School Placement

Prior to the commencement of the school placement, UAS Bioscience Students are provided with the following training:

1) An introduction to the Science National Curriculum (NC) and lesson planning/delivery, see sections 2.1.1 and 2.1.3.1 respectively, for further information;

2) Postgraduate Certificate in Education (PGCE) and a UAS training event, see Section 2.1.2 and 2.1.3.

2.1.1 The National Curriculum

The NC provides a statutory framework for compulsory education, stipulating what pupils should be taught between the ages of 5 and 16[29]. The aims of the primary school NC are for pupils to develop their knowledge and understanding of the world around them and provide them with the skills they need to engage with it[30].

2.1.1.1 Structure of the National Curriculum

The NC is structured on the basis of 4 Key Stages (KS) as shown in Table 2.1.

	KS1	KS2	KS3	KS4
Age	5-7	7-11	11-14	14-16
Year Groups	1-2	3-6	7-9	10-12
Method of Assessment	SATS*	SATS*	SATS*	GCSE ^

Table 2.1: age, year group and method of assessment that is associated with each KS. Standard Assessment Tests *, General Certificate of Secondary Education^

[29] Qualifications and Curriculum Authority http://www.nc.uk.net/nc_resources/html/about_NC.shtml [Accessed 12th March, 2008]
[30] Qualifications and Curriculum Authorityhttp://www.qca.org.uk/qca_13584.aspx [Accessed 12th March, 2008]

The National Curriculum includes core subject's Maths, English and Science and a number of others. Each subject at key stage has a programme of study associated with it, which sets out the knowledge, skills and understanding that each child should gain. There is clear continuity and progression through each of the Key Stages[31].

2.1.1.2 Science Key Stage 2

The pupils I worked with throughout my school placement were at Key Stage 2. The full programme of study for KS2 (Science) can be found using online resources.

There are four areas that pupils study during Science KS2:

- SC1: Scientific enquiry
- SC2: Life processes and living things
- SC3: Materials and their properties
- SC4: Physical processes

It is important that SC1 is taught through the context of sections SC2-SC3. Pupils should also have the opportunity to use a range of sources of information including Information and Communications Technology (ICT) – sources. The pupils should carry out investigations using first-hand and secondary data[32]

2.1.1.3 Assessment of Pupils Attainment Level

Pupils' attainment levels are assessed by SATS, in English, Maths and Science at the end of KS1-3. SATS results are published, so that comparisons of attainment levels can be made between schools. Throughout KS1-3 there are 8 Levels (L) of achievement (L1-8), each containing 3 sub levels (a-c). At the end of KS2, pupils are expected to reach L4 and are considered to be very bright if they reach L5[33].

2.1.2 Undergraduate Ambassador Scheme Student Training

[31] Qualifications and Curriculum Authority http://www.nc.uk.net/nc_resources/html/ks1and2.shtml[Accessed 12th March, 2008]
[32] Qualifications and Curriculum Authority http://www.nc.uk.net/webdav/harmonise?Page/@id=6001&Session/@id=D_a3V2Q9MpONIcNftXdXsk&POS[@stateId_eq_main]/@id=6419&POS[@stateId_eq_note]/@id=6419 [Accessed 12th March, 2008]
[33] SATS guide.co.uk http://www.satsguide.co.uk/what_are_sats.htm [Accessed 12th March, 2008]

The UAS Student Training was provided by The University of Nottingham's (UN) Widening Participating Unit (WPU). The training gave an insight into some of the responsibilities of an Undergraduate Ambassador whilst they are on their school placement and gave information on key issues. Topics covered in this session were:

- Communication Skills
- Health and Safety
- Child Protection/Safeguarding
- Handling Difficult Situations
- General Advice

2.1.3 PGCE

PGCE training was provided for myself and the other three students taking part in the UAS Bioscience scheme, the School of Education at NU ran the session.

2.1.3.1 Lesson Planning/Delivery for Science Lessons

Training to develop and deliver Science lesson plans was given during the Communicating Bioscience module and PGCE training event. These sessions aimed to address some of the key aspects that should be considered when developing lesson plans and delivering lessons, see Table 2.2

Lesson Planning	Lesson Delivery
Identify learning outcomes and links to the NC	Ensure lesson well prepared and rehearsed
Identify what the pupils already know	Have set of relevant questions
Choose activities that will engage the audience	Involve the audience at all stages of the lesson
Timings of activities	Create a positive environment
Resources e.g. teaching assistant, teacher's notes	Praise the pupils
Consider assessment of learning	Keep the pupils busy
Differentiation - ensure that activities are matched with pupils' abilities	Evaluate the lesson at the end of the session

Table 2.2: Key aspects to consider in lesson planning/delivery for science lessons

2.2. School Placement

It was my responsibility as the UAS Bioscience student to take ownership of the school placement; as such, I contacted the school at the earliest opportunity to arrange a visit.

On my first visit to the Primary School I met with my mentor (Deputy Headmistress / Class 7 Teacher) who I would report to throughout my placement. After an initial meeting she took me on a tour of the school and introduced me to the pupils in her class; who I was assigned to work with throughout my placement.

Class 7 is a mixed class of thirty-two girls and boys; they are in year group 6 (KS2) and are working towards their final SATS. Eighteen of the pupils in Class 7 have

Special Educational Needs (SEN). This can make teaching challenging because there is such variation in pupils' abilities.

2.2.1 Diary of Events

The format of the school placement was negotiated between myself and my mentor at the start of the placement. However, due to the nature of the primary school classroom, this was open to discussion (CR Retrospective Section 3.4.1 for details of the negotiation). However, generally I spent one afternoon per week at the school to assist with the pupils' Science lessons. The School Placement Diary (see, Table 2.3) gives an overview of my activities while I was on placement.

Week No. 2007/8	Date / Time (Meeting *)	Weekly Planner	UAS Student Activities
Week 1	Wed 10th Oct 13.30 –14.30 *		Meet my mentor
Week 2	Tues 16th Oct 13.30 –15.15	Habitats/ Interdependence	Observe teaching session Classroom assistant role*
Week 3	Tues 30th Oct 13.30 –15.15 15.30 –16.00*	Teeth and Diet	Observe teaching session Classroom assistant role* Meeting with mentor
Week 4	Tues 6th Nov 13.00 – 15.30	Varied and Balanced Diet (digestion)	Deliver lesson on digestion to 'Science Group' using teacher's material
Week 5	Tues13th Nov 13.00 – 15.15	Bones and Muscles	Deliver lesson to 'Science Group' using teacher's material
Week 6	Tues 20th Nov 14.00 –15.15 15.30 –16.00*	Heart and Blood	Deliver lesson to 'Science Group' using teacher's material Meeting with mentor*
Week 7	Tues 27th Nov 13.30 – 15.1515.30 – 16.00*	Life Cycle	Deliver lesson to 'Science Group' using teacher's material Meeting with mentor*
Week 8	Mon 3rd Dec 8.45 – 13.00 13.30 – 15.15	Healthy Day Food Tasting – L1 Balanced Diet – L2 Food Collage – L3 Physical Education	Deliver morning lessons (L) 1 and 2 to class 7 using my own lesson plan Classroom assistant role*
Week 9	Thurs 24th Jan 1.30 – 15.30	Conductors/ Insulators	Classroom assistant role*
Week 10	Thurs 31st Jan 13.30 – 15.30	Soluble/Insoluble (Saturation)	Deliver lesson on 'saturation' to the 'Science Group'
Week 11	Thurs 7th Feb 13.30 – 15.30	Separating Mixtures	Deliver lesson to 'Science Group'
Week 12	Thurs 21st Feb 13.30 –15.30	Small Group Investigation	Work on investigation with the Science Group'
Week13	Thurs 28th Feb 13.30 –15.30	Small Group Investigation	Work on investigation with the 'Science Group'
Week 14	Thurs 6th March 13.30 –15.30	Small Group Investigation	Work on investigation with the Science Group'

Table 2.3: Diary of my activities during the school placement. Classroom Assistant role* (supporting teacher in whole-class teaching).

2.2.2 Class 7's Science Curriculum

Class 7's Science Curriculum is taught in three blocks over the year, as follows:

- 1st term – SC2
- 2nd term – SC3
- 3rd term – SC4

The Science lesson plans used by the teacher are in the form of weekly planners and provide the following details:

- Main focus of teaching (links with the NC)
- Objectives of the lesson; teaching points
- Activities
- Differentiation in pupil ability. In Class 7 there are three levels of ability - high, medium and low.

2.3 Classroom Observation and Assistance

During the first two weeks of my placement I observed Class 7's Science lessons in my role as Classroom Assistant. This gave me an insight into the interaction between pupils and teacher, teaching methods used, lesson structure, differences in pupils' abilities and the level of science taught.

My main observations of the lessons were:

Teaching Methods

- Aims of the lesson were written on the board
- The teacher gave a short introduction to the lesson by informing the children what they were expected to learn
- The teacher involved the pupils in discussion early on by asking them to recap on what they already knew
- The teacher made an effort to involve all pupils
- The white board was used to show diagrams / pictures which the teacher referred to

Activities

- The timings of the activities
- On each week I was assigned to support a small group of pupils, I noticed that they seemed much more engaged in the activity that involved carrying out an experiment compared to the activity that involved filling in worksheets
- The pupils seemed to appreciate the discussion I had with them about the activities
- The pupils responded well to the support that I offered, however I encouraged them to come up with answers for themselves
- The pupils responded positively to praise

Behaviour Management

- Throughout the lessons there were two or three pupils who tried to disrupt the lesson. The teacher addressed this by naming the child and asking them to be quiet
- If the behaviour occurred on several occasions the pupil was asked to leave the room

During these lessons I was also able to walk around the classroom and talk with different pupils and discuss their work with them. This gave me an idea of the range of abilities within the class.

2.4 Supporting a Small Group of High Ability Students - 'Science Group'

During the school placement I taught the Science NC to a small group of high-ability, pupils. I have named this group the 'Science Group' for ease of reference. The group consisted of the same 6-7 pupils, most of whom had attained L4 or higher in their SATS assessments.

For the first few weeks that I taught the 'Science Group' (CR Section 2.2.1 diary, weeks 4-7), I delivered the lesson that they would normally have had. However, I used the teacher's own lesson plans as a guide to develop my own lesson plans for each of the subsequent lessons. This enabled me to consider the key aspects that are required for lesson planning and delivery. I also introduced the pupils to a new concept, which they would not have encountered in their normal lessons; for example, in Week 4's lesson about digestion, I introduced the topic of enzymes.

During these weeks, I was able to establish a relationship with the group and build up my confidence in small-group teaching. I was also able to judge the level of scientific knowledge understanding the pupils had.

2.4.1 'Saturation' Lesson Plan and Lesson Delivery

During the latter part of the placement I was given freedom to develop lesson plans for the 'Science Group' lessons. An example of this is a lesson that I prepared and delivered on Saturation. See Appendix 4 for a detailed lesson plan on Saturation. This is a fair test or comparing type of investigation (Harlen. 2005). A fair test involves consideration of which aspects of a test should remain constant[34].

2.4.1.1 Lesson Planning / Assessment of Learning

The key intended learning outcome of this lesson was to understand the concept of, saturation. The lesson[35] covered areas of SC1 and SC3 in the NC (CR section 3.1.1.2). However, I needed to incorporate into the lesson a recap on the pupils' knowledge and understanding of other concepts that they had previously learned, such as dissolving. It was necessary that they understood these concepts before the term saturation was introduced.

The main activity in this lesson was for the pupils to investigate, in groups of three, which solutions from a shortlist would become saturated the most quickly, using a fair test. The pupils are familiar with the fair-test concept from previous lessons (relating to areas Sc1 of the NC – CR 3.1.1.2); however, I planned to recap on this. Fair test investigations are useful because the pupils have to identify and control the variables (e.g. amount of sugar, *water* etc...)(Harlen,. 2005). At the end of the lesson one member of each group would present their findings.

2.4.1.2 Lesson Delivery

I began the lesson by encouraging the pupils to discuss what they had previously learnt at the beginning of the week. I asked the pupils to get in to two groups of three before introducing 'Activity 2'. I discussed with the pupils what they should

[34] National Curriculum in Action http://www.ncaction.org.uk/items/pdf/143.pdf[Accessed 10th January, 2008]
[35] [35] CGP Interactive (http://www.cgpbooks.co.uk/online_rev/ks2/science_page_01.htm) [Accessed 28th January, 2008]

consider when working in a group. The groups were then given the question to investigate. I asked that one member of the group record the experiment. Throughout the lesson I discussed with each group their progress and asked them questions to help them think about the task. One of the groups worked much more effectively and seemed to have a better grasp of the task. However, I aimed to give each group constructive feedback throughout the lesson. At the end of the lesson each group reflected on their work by presenting their conclusions.

2.4.2 Small Group Investigation

During the final weeks (wks 12-14 CR 3.2.1) of the placement my mentor authorised me to deviate from the normal teaching timetable. I planned to give the pupils a chance to conduct an investigation that would be related to both sections of the NC and to my own undergraduate subject area, nutrition. I discussed this idea with my mentor, who agreed but made the additional suggestion that they should decide for themselves how they would approach the task and what methods they would use.

2.4.2.1 Planning

The aim was that the investigation would cover several areas of the NC, including knowledge, skills and understanding in sections SC1 and SC2 (CR Section 2.1.1.2). My plan was to guide the pupils but ultimately allow them to decide how the investigation would take place. I wrote a set of teacher's notes to guide me through the discussion with the pupils about how they would carry out the investigation (Appendix 5).

2.4.2.2 Lesson Delivery

Week 1

I introduced to the pupils the idea of the investigation and explained that it would be carried out over a period of three weeks. Using the teacher's note as guidance I discussed the following with the pupils:

- What the pupils would need to consider when carrying out the investigation
- How they would work in a team effectively

- The format it would take e.g. aims, introduction, methods, results and conclusions
- How they would present the data
- Using reliable sources for information

After the discussion the pupils decided to:

- Investigate the following question: Do class members, on average, eat the government-recommended daily amount of fruit and vegetables?
- Collect 'consumption data' (how many portions of fruit and vegetables eaten per day)from 20 classmates
- Present the 'consumption data' on bar graphs
- Present findings of the investigation on a large poster

Week 2

I had prepared to support the pupils to analyse their 'consumption' data and continue with the investigation. However, there was a slight problem in that the children had not collected any data. I was unsure what to do initially as I had not prepared any other material. I decided to allow the pupils to play nutrition games on the Food Standards Agency (FSA) website to give me time to decide the course of action. I asked the pupils if they wanted to continue with the investigation but collect 'consumption data' only on the amount of portions of fruit and vegetables that they consume themselves. They agreed and decided to record the 'consumption data' over a three day period during the subsequent week.

Week 3

In the final week it was clear to me that the investigation could not continue because the pupils had again not collected the data. However, I thought it would be appropriate for the children to carry on with the same theme. I asked the pupils to design a poster about the importance of eating '5 A Day' (five portions of fruit and vegetables per day).

2.5 Special Project - 'Healthy Day'

It is recommended by the UAS that the UAS Student take on a project within the classroom which involves taking a lead role[36]. I discussed this with my mentor early on in my placement. We decided that I would organise a morning of teaching for the whole of Class 7, based on a nutritional topic. In the afternoon, I would support the Physical Education teacher as a Classroom Assistant. I named the event 'Healthy Day'. It was important that I started planning at the earliest opportunity as ideas that I had needed to be discussed with my mentor to check their suitability. A key factor that I needed to consider for these lessons was differentiation, which will be discussed in section. I planned the first two lessons of morning, the third lesson being organised by the teacher.

2.5.1 Lesson Plan 1 - Food Tasting

This lesson aimed to give pupils an opportunity to try a variety of unusual foods while associating each one with the nutrients it contained. The foods provided were a selection of fruit, bread and cheese. Another important consideration was to try and incorporate some fun into the lesson. See Appendix 2, for a detailed lesson plan.

2.5.1.2 Lesson Plan 2

Lesson 2 (Appendix 3) included three activities:

1. To introduce 'The Traffic Light System' (TLS) on food labelling, which is endorsed by the Food Standards Agency (FSA); a reliable source.
2. The interactive 'Eatwell plate' a large floor mat with a diagram of an empty 'Eatwell Plate'. The pupils are given a variety of plastic replica food items to put into the correct sections
3. Design a nutritionally balanced meal (CR retrospective re cognitive processes)

Sources used for activities, see footnotes

- British Nutrition Foundation[37][38]

[36] Undergraduate Ambassador Scheme http://www.uas.ac.uk/universities.php?id=162[Accessed 10th January, 2008]
[37] British Nutrition Foundation.
http://www.nutrition.org.uk/home.asp?siteId=43&sectionId=604&subSubSectionId=324&subSectionId=320&parentSection=299&which=1 [Accessed 1st November, 2007]

- Food Standards Agency[39][40]
- Vegetarian Society[41][42]
- National Curriculum[43]

2.5.1.3 Differentiation / Assessment of Learning

When preparing lesson plans for the 'Healthy Day' I had to consider differentiation of the pupils abilities. All pupils were able to participate fully in the lesson's activities; however, some of the low-ability children required support to fill in the food-tasting worksheet 1A (Appendix 2). Teaching Assistants were available for support. For lesson 2 I designed worksheet 2A for all abilities and worksheets 2B and 2C for medium/high ability-pupils, in case they required more of a challenge (Appendix 3).

Assessment of pupil learning took place through general observation and discussion with the pupils throughout each of the activities. At the end of the morning I set a quiz for the whole class using a set of prepared questions.

2.6 Engagement between the UAS Bioscience Student and the School-Pupils

To assess the effectiveness of the engagement between myself and the school pupils I have provided the following:

- Observations from the Bioscience UAS Student (myself)
- A teacher's testimony and feedback from the teacher about the Healthy Day
- A questionnaire completed by the 'Science Group' members

2.6.1 Bioscience UAS Student

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[38] British Nutrition Foundation.
http://www.nutrition.org.uk/home.asp?siteId=43&sectionId=605&subSubSectionId=324&subSectionId=320&parentSection=299&which=1 [Accessed 1st November, 2007]

[39] Food Standards Agency Website http://www.eatwell.gov.uk/foodlabels/ [Accessed 1st November, 2007]

[40] Food Standards Agency Website http://www.eatwell.gov.uk/healthydiet/eatwellplate/ [Accessed 1st November, 2007]

[41] Vegetarian Society http://www.vegsoc.org/youth/school/ks2/notes4.html [Accessed 1st November, 2007]

[42] Vegetarian Society http://www.vegsoc.org/youth/school/ks2/notes4.html [Accessed 1st November, 2007]

[43] [43] Qualifications and Curriculum Authority
http://www.nc.uk.net/webdav/harmonise?Page/@id=6001&Session/@id=D_a3V2Q9MpONIcNftXdXsk&POS[@stateId_eq_main]/@id=6419&POS[@stateId_eq_note]/@id=6419 [Accessed 12th March, 2008]

During the Healthy Eating Day all the children joined in with the food tasting session and were eager to discuss their experiences with myself and classmates. The lesson that involved the 'Eatwell Plate' and 'Traffic Light Labelling' provoked discussion between the pupils and teachers. Pupils of all abilities were able to participate in these activities.

My experience of working with the Science Group throughout the placement was a positive one, and the pupils always made the effort to engage with me. Several of the pupils expressed to me that they preferred learning in a small group because it gave them more time for discussion during the lessons and more opportunities to answer questions, which they liked doing.

The 'Science Group' was involved in activities that they may not ordinarily have been introduced to, such as investigative sessions and group work. Not all of the lessons that I delivered were entirely successful, however none of them produced any negative factors. If things did go wrong I was able to discuss this with the pupils and set new tasks where appropriate

Throughout the school placement there were not many opportunities for me to discuss with the children their aspirations for the future. However, I did on the odd occasions discuss with the 'Science Group' what their educational goals were. They all expressed the desire to study at university. However, only one of them wanted to be a scientist.

2.6.2 My mentor

The majority of my teaching had not been observed by my mentor, thus I requested that she complete a 'Teacher's Testimony'.

2.6.2.1 *Teacher's Testimony*

Teacher's Testimony is a structured document based on a series of five questions about their pupils' engagement with the UAS participant. According to Teacher's Testimony (Appendix 6), the pupils who worked in the Science Club improved/developed in the following areas:

- They seem more confident in their own ability when discussing science concepts and are more ready to 'take risks' when answering questions or tackling new work
- They have gained more confidence in designing new experiments and are more able to discuss what they want to find out and they are more able to draw conclusions
- All of the pupils in the 'Science Club' improved their mock SATS results in their mid-term assessments. Three of the children improved by one sub–level (CR Section 2.1.2) and one pupil improved by 2 sub-levels. See Figure 2.1:

Graph Shows a Comparison of SATS Results of the Science Group between October and January 2007/8

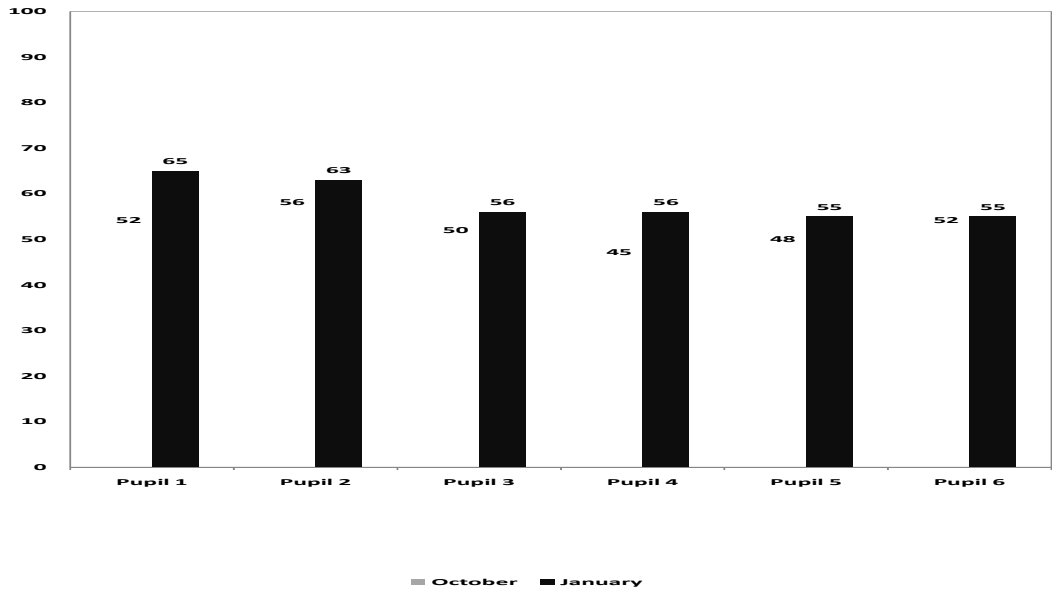

Figure 2.1: improvement in Pupils SATS results from October 2007 to January 2008.

2.6.2.2 *Feedback from the 'Healthy Day' Lessons*

Feedback from my mentor (Appendices 2 & 3) who observed the Healthy Day lesson states that:

- The food tasting session was extremely well received by the children and all of the pupils got involved in discussions about the activities that they were involved in
- The 'Eat Well Plate' activity was excellent and the pupils were involved in discussions about the activities

2.6.3 Pupils

I designed a short questionnaire for members of Science Club to complete. This was done anonymously with the expectation that they would answer honestly. See table 2.4

Please answer the following questions about the science lessons that you had with Miss Honeyman-Smith. Circle the answer you agree with most; Yes, No or Don't Know		Yes	No	Don't Know	Total
1	Did you find it easier to work in a small group?	7	0	0	7
2	Did you find it easier to learn when working in a smaller group?	7	0	0	7
3	Did you have more chances to ask/answer questions when working in a small group?	7	0	0	7
4	Are you more interested in subjects about health and nutrition than you were before?	6	0	1	7
5	Do you think having science lessons with a university student (Miss Honeyman-Smith) has helped improve your grades in your science tests?	6	0	1	7
The following questions are about the Healthy Day project					
6	Did the lessons in the 'Healthy Day' help you to learn what foods are healthy and why?	7	0	0	7
7	Did the food tasting session help you to learn about different foods?	5	1	1	7
8	Did you think the 'Healthy Day' was fun?	6	0	1	7

Table 2.4: Questionnaire to assess the effectiveness of the engagement between the UAS student and the school pupils that participated in the Science Group

BIBLIOGRAPHY - SCHOOL PLACEMENT REPORT

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CHAPTER 3: RETROSPECTIVE

3.1 Introduction

This chapter includes a reflection on my learning experiences while participating in the Bioscience UAS project during the final year of my Nutrition degree. During this period I kept a weekly journal based on thoughts and feelings about my experiences of the project. The journal allowed me to reflect on ways that my views and opinions had changed as a result of these experiences. It also provided me with a basis for monitoring how my knowledge, skills and understanding have developed throughout the project.

The Retrospective includes an evaluation of my own UAS participation in relation to learning and teaching theories and strategies, discussed in the Literature Review and critical analysis of the school placement. Finally, conclusions are drawn about the effectiveness of the UAS scheme, and in particular the Bioscience UAS, in terms of enhancing the learning of school pupils and undergraduate participants like myself.

3.1.1 Why I chose to take part in the Bioscience UAS Project

In Semester 4 I participated in the Communicating Bioscience module, which introduced me to the practice of keeping a reflective journal about my studies. Reflecting on my learning experiences was an invaluable experience and an effective approach to aid my learning as it enabled me to recognise my strengths and address weaknesses that I identified.

Taking part in the Student Associate Scheme (SAS) last summer (2007) boosted my confidence, as well as providing an insight into teaching as a potential career. However, during the SAS there were few opportunities to teach around my own subject area. The UAS, meanwhile, seemed to offer an opportunity to further my development in an educational setting, whilst taking on the role of ‘ambassador’ for my own subject area.

I thought that taking part in the Bioscience UAS Project would allow me to:

- Gain an understanding of learning and teaching theories and strategies

- Further improve my communication skills in my degree subject (Nutrition)
- Gain transferable skills through working in different contexts
- Gain further insight into teaching within the classroom

3.1.2 Reflection on my own Learning

Throughout the project I reflected on my own learning and on the pupils' learning. Reflection enabled me to recognise my strengths and weaknesses (Biggs, 2003) in relation both to supporting pupils in the classroom and to the development of my project. At the end of each session, during the school placement, I made notes about the day's events in relation to my thoughts and feelings, and ways that I might improve what I did the next time. At the end of each week I recorded my thoughts, views and opinions on the project, including the research process, lesson planning and lesson delivery. Beech *et. al.* (2003) state that if students are to achieve 'deep learning', they must engage in a structured process of reflection. Adopting this practice myself helped me to understand how learning happens, what works in the classroom and why, and how existing learning and teaching strategies might be improved.

3.2 Reviewing Learning and Teaching Theories

Conducting a detailed literature review enabled me to consider activities within the classroom, in relation to the theoretical concepts that underpinned them.

Initially, the review of learning and teaching theories caused me concern as I was unfamiliar with the literature: during my degree I have been taught to review, analyse and critique scientific research; the more discursive style of learning and teaching literature was difficult to interpret at first. However, I approached the situation by asking the school library for guidance on how to access the literature. However, a majority of the research papers that I attempted to access via eLibrary Gateway were not accessible to The University of Nottingham. A taught session prior to the school placement to introduce learning and teaching theories and strategies would have been extremely useful.

Several influential learning theories are evident in school teaching and each theory encompasses a number of different outlooks from different theorists (Bigge & Shermis, 1998). With this in mind, it was clear that providing a comprehensive

review of learning and teaching theories was beyond the scope of this dissertation. However, I endeavoured to describe some of the main theories and show their continuing influence in both schools and universities.

3.3 How Have My Skills Developed?

The UAS aims to give participants the opportunity to improve their transferable skills, which will ultimately be invaluable in future careers[44]. In this section I have considered how my confidence and communication skills have improved.

3.3.1 Communication/ Presentation Skills

During the school placement I was given numerous opportunities to practice my presentation and communication skills. teaching nutrition-based topics in the primary school classroom has given me an opportunity to improve my communication skills. I enjoyed this experience and after initial nerves had passed, I felt confident and at ease with the situation. I gave a presentation to the current group of Communicating Bioscience students about the UAS and my placement. Although I still experienced nerves I felt that my performance was better than usual. This is probably because I had been actively involved in the learning experience, so therefore had a better understanding of the topic.

3.3.2 Confidence

Before participating in the UAS and SAS I had considered teaching as a career; however, I lacked confidence and believed that I was not capable or clever enough to teach. I assumed that all teachers are extremely confident and have excellent subject knowledge. Through observation of classroom activities, discussion with my mentor and other teachers, I have realised that being a successful teacher is not about knowing lots of information. To be a successful teacher requires many qualities including the following skills communication, preparation, negotiation and prioritisation. A good rapport with children and a certain resilience seem to be essential characteristics, both of which I believe I have. These observations impressed on me that it was my lack of confidence that was holding me back. Throughout the scheme I have had the opportunity to teach or tutor a variety of audiences. Ensuring that I had prepared and rehearsed lessons properly, along with

[44]Undergraduate Ambassador Scheme http://www.uas.ac.uk/universities.php?id=126 [Accessed 2nd April, 2008]

the practice of delivering the lessons has helped improve my confidence. As a result, I have come to reconsider teaching as a career option.

3.4 Application of Learning and Teaching Theories in the Classroom

Before I started the Bioscience UAS Project I had not considered learning and teaching theories, or that individuals use different strategies to learn. As the placement progressed, I gained more of an understanding of the ways that the pupils learned and the techniques that I was drawn to using as a result of reading the literature.

This section considers my activities during the school placement in relation to the learning and teaching theories discussed in the Literature Review. An account of the negotiation between myself and my mentor will be given first.

3.4.1 Negotiation of the School Placement

During the initial meeting between myself and my mentor, we discussed ways we might both benefit from the school placement. I expressed that I would like to experience planning and delivering lessons on Nutrition (my degree subject), and other areas of the Science NC, which I might find more challenging.

My mentor suggested that I organise a morning of teaching on Nutrition, near the end of the Autumn term. We decided that the lessons would act as a revision session but would also be enjoyable. However, we agreed that initially I would observe lessons and act as a Classroom Assistant, to help establish lesson structure and interactions between individuals within the classroom.

My mentor suggested that during my placement I teach the Science NC to a small group of high-ability pupils (CR SPR Section 2.4). The rationale behind this was that I would be able to provide them with more individual attention. My mentor explained that this group of children are *bright* and are keen to ask questions and enter into discussion, in Science lessons. However, there are several children in the class who have behavioural difficulties, which can have an impact on the other pupils' learning.

3.4.2 Classroom Observation

It was important that I observed lesson delivery as it would provide me with an insight into the teaching methods used within the classroom. As such and I would be able link application of teaching within the classroom with the theoretical framework.

During each of the observational sessions I was assigned to work with a small group of pupil. The teacher used a combination of teaching strategies during these lessons (CR SPR Section 2.3). For instance, in one of the lessons, the teacher used a direct teaching method, which is a behaviouristist approach (See Table 3.1). The teacher introduced the lesson by telling the pupils what they were expected to learn (Skinner, 1974), then set a supervised task. During the lesson, she asked questions to confirm that the pupils had learned what they were supposed to (Kyriacou, 1995).

A cognitive approach (See Table 3.1) was evident in the other lesson as the teacher involved the pupils in a discussion about what they already knew on the topic. At this point, the teacher was able to identify and rectify any misconceptions that the pupils had (Kyriacou, 1997). An activity was set which involved experimental work and the pupils had to compare their findings (Moyles, 2007). The pupils were much more engaged and open to discussion with me, in the activity that involved them *thinking* and *doing* as opposed to filling in worksheets. During this activity it was difficult to keep the pupils engaged. However, in this instance I used a behaviourist approach by giving the pupils plenty of prompts and praise (positive reinforcement) (Bigge & Shermis, 1998) when they answered correctly. The pupils did respond well to this method, however, it was tiring as the pupils only stayed focused when I used continual prompts.

Theory / Method	Behaviourist	Cognitive
Teaching	Transmission	Guided discovery
	Direct Teaching/active	
Individual learning	Passive	Activities organised by the teacher that give opportunity for insight and reflection to occur
Feedback	Regular praise to desired behaviour	Given throughout learning process
Assessment method	Questioning	Questioning and observation

Table 3.1: Overview of behaviourist and cognitive learning and teaching learning theories and how they are applied. Adapted from: Teaching, Training and Learning (Reece & Walker, 2007)

3.4.3 Teaching the Science Group

Teaching the Science Group gave me the opportunity to apply learning and teaching theory/strategies to the classroom environment. As my communication skills and confidence improved throughout the placement, so did my relationship with the pupils. Through discussion with my mentor, it was decided that for the first few weeks, I would teach from the lesson plans provided by the teacher. This was a good opportunity to develop a positive relationship with the pupils. These lessons appeared to show a teacher-centred approach, while the students were largely passive learners (see Table 3.1). Prior to each lesson, I developed a lesson plan; at the end, I noted how the lesson had gone. This enables me to reflect on the reasons for teaching successes and failures, and begin to see what I could do to improve the lessons. As each week progressed, I endeavoured to incorporate more pupil interaction into each lesson. For instance, I involved the pupils in discussion about what they already new at the beginning of each session and tried to relate the subject to their personal circumstances. This was well-received by the pupils (Reece & Walker, 2007). As my confidence improved, I felt ready to start planning my own lessons for the Science Group. However, in retrospect I wish I had included more

activities at the beginning of term, as here the lessons were about 'Biological Concepts', an area I am familiar with. However, in the second half of my placement, the topic changed to 'Materials and their Properties'. As such, I had to ensure that I knew about the subject myself prior to teaching. However, the lesson planning process helped with this as I needed to understand the subject thoroughly before I could begin to plan a lesson around it.

For the lesson about the concept of *saturation* (CR SPR Section 2.4.1), I designed an activity based on a constructivist approach to teaching and learning. I explained to the pupils that they were to design their own experiment and that I would guide them through activity, acting as a facilitator of their learning. At the end of the session, the pupils reflected on their learning experiences by feeding back (Reece & Walker, 2007) to the group what they had leaned. I feel that some of the pupils were slightly unclear about what was expected of them. Normally, when doing experiments, they are given written instructions to follow. Therefore, this lesson could have been more successful had I provided the pupils with a set of instructions. However, this would have defeated the purpose of the exercise. Harlen (2005) states that when planning investigations, pupils are often guided too heavily by the teacher. This results in pupils completing the task, but not knowing why they did it.

For my last three weeks with 'Science Club', I decided to ask the group to investigate a specific question (CR SPR Section 2.4.2). My mentor gave me the go-ahead to do this and requested that the pupils be allowed to decide for themselves how they would approach the task and what methods they would use. However, these lessons were unsuccessful in the respect that they did not go as I had planned. I wanted the pupils to have an opportunity to plan their own investigation from start to finish, so that they would have an understanding of each step of the process. However, I think that I expected too much from the pupils and I may have confused them by bombarding them with too much information and not enough structure. I do not feel there was anything wrong in the idea itself, but perhaps these pupils were not ready for such a different approach. During the third lesson, when it was apparent that the investigation could not continue, I had to use my initiative and come up with an idea that would engage the pupils for the remainder of the lesson (CR SPR Section 2.4.2).

3.4.3 Learning and Teaching and the Healthy Day

Feedback from my mentor (Appendix 2 & 3) states that the 'Healthy Day' was extremely well-received by the pupils. I feel that this was the most positive day of my school placement. I planned the lessons so each had a clear theme and designed activities that the pupils would not only gain knowledge, skills and understanding throughout the lesson, but also have the opportunity to *apply* what they had learned. For Bruner, individuals learn by linking new information with past experience and transforming it into new understandings. I feel these lessons were successful because they were *active* and involved the pupils comparing and reflecting (See Table 3.1) (Moyles, 2007). It has been reported that active learning produces a better understanding (Kyriacou, 1997). Due to the large class size and the fact that there were several activities happening at once, it was sometimes difficult for me to pay adequate attention to all pupils. However, I had considered this when planning the lessons and asked that my mentor and Teaching Assistants were also available to support the pupils. Assessment of student learning was achieved through observation and a quiz at the end of the lesson. However, I underestimated the number of questions I would need, thus I had to think of several extra questions on the spot.

3.5 Critical Analysis of the School Placement

This section examines critically whether the school placement was effective at increasing the learning of school pupils, the undergraduate participant and the teacher.

3.5.1 Pupils

My idea behind teaching the Science Group was to introduce them to different activities they would not have the opportunity to do. However, I did not always consider if they were equipped with the relevant knowledge and understanding that they required to participate in the activities. For instance I expected them to work collaboratively in a group but I had not considered whether they had done this before. However, despite the fact some of the lessons did not go to plan I still feel the pupils benefited overall. The small group size gave each of the pupils more time to communicate their ideas. On several occasions the pupils expressed that they appreciated have more time to discuss and ask questions. The group was involved in much more discussion about scientific concepts than they would have had in their

normal environment. My mentor states in the teacher's testimonial (Appendix 6) that the pupils in this group seemed to have improved when discussing scientific concepts and designing their own experiments. This group SATS results also improved (CR SPR Section 2.6.2). However, these events could have occurred despite their engagement with the Bioscience UAS student (myself): *correlation* does not prove *causation.*

The Science Group completed a questionnaire (CR SPR Section 2.6.3) about the Science lessons they had with me. The results are positive. However, the questionnaire was not properly designed to eliminate ambiguity. Using a pre- and post- (UAS participant) questionnaire may have been useful to ascertain the pupil's thoughts about studying science.

My interactions with the pupils during the Healthy Day were very positive. The pupils were able to deepen their understanding of the topic by building on previous knowledge and relating the lessons to real life (Reece & Walker, 2007). Feedback from my mentor (Appendices 2 & 3) was also positive. These lessons involved the pupils in activities which they might not normally get to experience. Examples of this are the food tasting session and the Eat well Plate exercise.

I do not feel I had an impact on raising the pupils' awareness in regard to them considering studying H.E.as there were not many opportunities to discuss this. To address this, I could have arranged for a school visit to The University of Nottingham. Research undertaken by Campbell (1994) suggests that it is difficult to evaluate whether tutors can raise the aspirations of primary school pupils in relation to H.E. because they may not have considered what they want to do in the future and there may already be systems in place to address this.

3.5.2 UAS Participant

Throughout the school placement I have enhanced my communication and presentation skills, and my confidence has improved. However, this progression could have occurred despite participation in the UAS scheme. I am in the final year of my degree, during which time it would be expected that students develop their skills. However, this scheme specifically aims to develop transferable skills, such as communication and presentation. In addition, through reflection I have noted my

strengths and weaknesses. Had I not kept a journal, these may have gone unnoticed.

3.5.3 Teacher

I am unaware at this time whether I have had an impact on my mentor's learning. However, they will later be asked to complete a UAS questionnaire that will address this question.

3.6 Conclusion

There is evidence in the research literature to suggest that the UAS and similar schemes show some learning benefits both for school pupils *and* for UAS participants. This study of the Bioscience UAS also shows some positive results for these groups.

However, much of the qualitative evidence about learning benefits is anecdotal; to bring more authority to the findings of these studies, quantitative and qualitative methods should be brought together in an effective way. Quantitative data provides the wider picture, but qualitative methods are needed to fill in the gaps and add detail. However, even here, *correlation does not prove causation*; even where benefits can be demonstrated, UAS cannot easily be shown to be responsible for these gains. To help establish the true benefits of UAS and similar projects, matched control groups should be established to see if evidence is consistent from one scheme to the next.

More rigorous long-term evaluation is needed to convincingly demonstrate the educational benefits of the UAS. If *all* tutoring schemes adopted the same research framework to evaluate effectiveness, the results could be pooled and meta-analysis carried out.

Keeping a Learning Journal enabled strengths and weaknesses to be monitored throughout the Biosciences Project. Reflecting on learning experiences enables the learner to see how things worked.

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STUDENT INFORMATION SHEET 2007/8

undergraduate ambassadors scheme

DETAILS OF THE SCHOOL YOU WILL BE WORKING IN

Name of School:	MELBURY PRIMARY SCHOOL
What type of school is it: Please tick:	☑ Primary ☐ Junior ☐ Secondary ☐ Sixth Form College ☐ Other (please state).....
School Address & Tel No:	MELBURY RD BILLBOROUGH NOTTINGHAM NG8 4AU
Name of your teacher(s) including first name or initial:	MRS. STEPHANIE PEARSON
Which year groups will you be working with: Please tick:	☐ Year 1 ☑ Year 6 ☐ Year 11 ☐ Year 2 ☐ Year 7 ☐ Year 12 ☐ Year 3 ☐ Year 8 ☐ Year 13 ☐ Year 4 ☐ Year 9 ☐ Mature students ☐ Year 5 ☐ Year 10 ☐ Don't know yet
How will you do you do your hours in school?	☑ In a block i.e. a whole morning or afternoon ☐ Spread across the week ☐ Don't know yet
How many hours will you do in school each week:	2-3 (1 session at 6½hrs)

UAS Student Information Sheet 2007/8 2

Appendix 2

Lesson: Food Tasting – Year 6		
Name: Rosie Honeyman-Smith	Date: 03/11/07	Time:9.15 – 10.30

Learning Outcomes:	Reference to NC:
To know that we need a varied diet to stay healthy and why. To know different foods that helps us to stay healthy. To know that different foods provide different nutrients. Describe how a food taste Fill in a food tasting table Make a decision about liking or disliking a certain food and the reasons for this.	About the need for food for activity and growth, and about the importance of an adequate and varied diet for health Student Objectives: Deliver a planned lesson Work as part of a team Reflect on the strengths and weaknesses of the lesson

Activities/Timings	Student (me) Input / Assessment	Resources and Support
Starter (15min) Teacher talks about healthy eating, and invites discussion about what the children already know Main Activity (50min) Children to taste different foods provided	-Lead discussion and encourage participation -Introduce food tasting session and explain how to fill in food tasting session table. -Ask children to think of ways to describe how the food tastes (record info on wipe board). -Handout 'food tasting tables' -Give out food to taste. -Student/ Teacher /Teaching Assistants to	Student Notes (Starter) - 3A Interactive white board (showing 'food tasting table') Student Notes

and then fill in the 'food tasting session table Plenary (10min) Class discussion	circulate and help children that are struggling to fill in 'food tasting table' Lead the discussion about what the children liked /disliked about the foods that they tasted. Ask a few children to read a section of their food tasting table (if time).	(Instructions) – 3B Food tasting session table - 1A Teacher and Teaching Assistants support

Differentiation		
High Ability	Medium Ability	Low Ability
Fill out more than one food tasting tables without support.	Fill out food tasting table without support	Teaching Assistants support to fill out food tasting tables

Teacher's Notes

Introduction of the 'healthy day'

Explain to the children that the theme of the day is about eating a varied diet and getting plenty of exercise to stay healthy. Encourage the children to participate in the lessons through discussion and by asking and answering questions when appropriate. Explain that at the end of the day the teacher will be putting up a display with some of work that the children have done through out the day.

Morning Lessons

Lesson 1: food tasting

Lesson 2: nutrition labels and 'the eatwell plate' (a balanced diet)

Lesson 3: food collage

Afternoon Lessons

Physical Activities

Starter-3A

Explain to the children that a good diet and lots of exercise are two things that are essential to staying healthy. The way that they nourish their bodies now will affect their growth and health as adults and they need all the nutrients and energy from a good healthy diet to grow up to be fit and healthy adults. Explain to the children that good diets have plenty of energy and nutrients from a wide variety of different sources.

Introduce food tasting session -3B

Explain to the class that there are a variety of foods (fruit, bread and cheese) for them to taste and that they may have not tasted some of them before.

Ask the children what are the nutrients that they can get from these foods and why they need these nutrients

Food	Nutrient	Why we need the nutrient
Bread	Carbohydrate (starch) Some calcium and iron Vitamin B Fibre	**Carbohydrate** - energy for running, working, sleeping, eating etc **Fibre** – healthy digestion
Cheese	Vitamin B12 Vitamins A and D Calcium Protein Fat	**Vitamins and minerals** – are required by many functions in the body and help us to have healthy nails, eyesight, skin and hair. **Protein** - growth (especially children) and repairing the body **Fat** – is a source of energy energy that does not get used in the body gets stored as fat

Fruit	Vitamin C Folates Fibre Some carbohydrate	**Vitamins and minerals** – can help prevent diseases, and keep our hearts healthy. **Fibre** – healthy digestion **carbohydrate -** Natural fruit sugar

The following steps should be taken:

1. Put the children into groups of 4-6
2. Each group will have 6-8 different foods to try
3. Children taste one type of food then fill in the 'food tasting session table' (the picture of the food does not need to be in a lot of detail, just a rough outline will be fine).
   Use the interactive white board to show the children a copy of the 'food tasting session table' and explain how to fill it in by giving a couple of examples (on white board).

4. Repeat step 3

Science Lesson Plan: Year 6

Lesson Evaluation

Personal Response (reflection) I felt quite relaxed, surprisingly, introducing the lesson. Overall the lesson went really well. I felt there was a lot of positive engagement by the majority of pupils. Most of the children tried the different foods, even though they had never had them before. I walked around the classroom during the activity and discussed with the children their thoughts about the food e.g. did they like them? Why? what did it taste like? etc... The children found the work sheets easy to fill out and some of them were able to discuss what nutrients were in food and why the body needs the specific nutrient. I feel this activity helped the children to make an association between food and the nutrients it contains. Some of the children ate food + forgot to fill in the worksheet but that was okay - most filled in at least one and some filled in several

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Leaning Objectives covered

Ref to National Curriculum Life process and Living things

The learning objects was covered

Areas for Improvement/development

- The worksheets could have been made more attractive
- Try and involve all the children when asking questions to the class. The same children tend to put their hands up to answer questions.
- I didn't have time to do the plenary because the lesson finished earlier than I had anticipated. this was a shame because it meant the whole-class didn't get to have a discussion about their food tasting experience, together.

Observers Comments

Name: S. PEARSON

This was a well-conceived lesson which the children thoroughly enjoyed. They were able to talk sensibly about likes and dislikes. Children were exposed to a range of foods which they wouldn't have tasted in other situations.

Detailed lesson plan and preparation.

Year six: Food Tasting Session 1A

Name of food e.g. orange	Type of food e.g. fruit	Picture of the food	Nutrients in the food (there maybe more than 1)	Why do we need these nutrients e.g. energy	What did it taste like and would you eat it again?

Appendix 3

Science Lesson Plan: Year 6

Lesson: Balanced Diet		
Name: Rosie Honeyman-Smith	Date: 03/12/2007	Time:11.00-12.00
Learning Outcomes: -To be able to describe a balanced diet -Design a balanced meal - Analyse food labels, learn what they mean		Reference to NC: Life processes and living things: SC2 2b.The importance of an adequate and varied diet for health Investigative skills: SC1 2i. make comparisons or associations in data Knowledge, skills and understanding: 1a. using a range of sources of information Communication: 2a. Use appropriate scientific language and terms and communicate ideas
Student Objectives: Deliver a planned lesson Work as part of a team Reflect on the strengths and weaknesses of the lesson Analyse if the children have learnt the outcomes		

Activities/Timings	Student Input / Assessment	Resources and Support
Discuss with Stephanie the timings		
Starter (10min)	Traffic Labeling Presentation	Teacher's notes 5A Powerpoint Presentation 6A
Activity 1 (20-40min) Put the class into groups Traffic labeling	Hand out worksheets. Student/ Teacher /Teaching Assistants to circulate and help children that are struggling to fill in	Teacher's notes 5A This is my traffic light system worksheets 2A, 2B AND 2C
Activity 2 (5-6min/group). Start at 11.30 for the first group. 'The eat well plate' floor mat and plastic food.	Introduce the 'The eat well plate' floor mat and plastic food and lead the discussion.	Teacher's notes 5A Eat well plate presentation-4A 'The eat well plate' floor mat and plastic food.
Activity 3 (20min) Design an eat well plate for one meal	Introduce activity and hand out paper plates	Teacher's notes 5A Paper plates
Plenary	Lead the discussion about what the children discovered during the activities	

Differentiation		
High Ability	Medium Ability	Low Ability
Complete This is my traffic light system worksheets 2B and 2C	This is my traffic light system worksheets 2A	This is my traffic light system worksheets 2A

Clear progression.

Science Lesson Plan: Year 6

Lesson Evaluation

Personal Response (reflection)

I feel I delivered the presentation very well and again I was not that nervous! However, the children are not used to this kind of presentation and I think the ppt slides may have distracted some of them, from what I was saying.

I think the 'eat well plate' exercise was good because it gave the children an opportunity to think about what foods go in each section, rather than just looking at a picture. In reality each group stayed at the 'eat well plate' much longer than 6–7 minutes. The worksheets 2A were filled in very well by all of the class. Children stayed engaged but class got very noisy at times. The children were very keen to show me their work sheets and discuss it with me.

Leaning Objectives covered

Areas for Improvement/development

- Instead of a ppt presentation it may have been more succesful to give an introduction to the lesson using a couple of diagrams/ e.g. traffic label, and involve the children more in a discussion about their own experiences of this topic (what they already know)
- The work sheets 2A would have been better if they were more attractive and if they had a section which asked the children to say if they thought the food was healthy, high in fat, calories etc. Some sections on work sheet 2B were too hard and a bit complicated to understand.

Teachers/Observers Comments (SP)

Lesson went well. The small group focus working on 'eat well plate' was excellent. Children enjoyed 'traffic labelling' & were having good discussions. They also enjoyed designing a eat well plate.

Detailed lesson plan and preparation.

Could you 'jazz' ~~food~~ children's worksheets up a little using clip art?

Starter

6A – talk through the presentation

Explain to the class that if we want to eat a healthy diet, one of the key things we should be doing is trying to cut down on fat (especially saturated fat), salt and added sugars.

Many supermarkets and food manufacturers are using traffic light colours on the labels of some products to help you make your choice easier. **Show the children an example of a traffic-light-system, on the white board.** Food products with traffic light labels on the front of the pack show you at-a-glance if the food has high, medium or low amounts of fat, saturated fat, sugars and salt, helping you get a better balance. It also tells you how many calories are in the food.

- Red light on the front of the pack, you know the food is high in something we should be trying to cut down on. It's fine to have these foods occasionally, or as a treat.
- Amber, you know the food isn't high or low in the nutrient, so this is an OK choice most of the time, but you might want to go for green for that nutrient some of the time.
- Green means the food is low in that nutrient. The more green lights, the healthier the choice.

You will also see the number of grams of fat, saturated fat, sugars and salt on the traffic-light-system and the recommended serving suggested by manufacturer. The traffic light colours will make it easier for you to compare products at-a-glance, because the label tells you how much of each nutrient is in a portion, so if two labels have similar colours you can compare these figures, and choose the one that is lower to make a healthier choice.

You should also try to remember that although some products may contain a lot of sugars, they can be healthier choices if they contain lots of fruit. You can tell this by checking the ingredients list; the higher up the ingredients list the more fruit there is.

Nutritional Labelling (HA/MA –if time)

The traffic light colours on the front of food packs are a quick and easy guide, but when you have time, and if you are particularly interested in finding out more, you can still check the back of packs for more information.

You often see this panel on the back of food packs. It gives the nutritional breakdown of the food. This is the sort of information you might see: the amount of energy, protein, carbohydrates, sugars, fat, dietary fibre and salt. You can use this information to help you make healthier choices. To get a feel for whether a product is high in a certain ingredient such as fat, salt or added sugars, you might need to

look at the ingredients list. Ingredients lists always start with the biggest ingredient first and are listed in descending order of weight at the time they were used to make the food.

Explain what the average amount of calories teenagers need a day is, to stay healthy but that it could be higher or lower than this amount depending on how active they are

Boys aged 11 to 14 need about 2,220 calories a day. Girls aged 11 to 14 need about 1,845 calories a day.

Starter – 'The eatwell plate' (activity 2 and 3)

The Eatwell Plate

Introduce the 'The eatwell plate' floor mat and plastic food (lent to the school by Nottingham University). The children have come across this before in previous lessons.

Before activity-2, ask the class why some sections are bigger than others. Explain that it is because we need more of these types of foods in our diets to stay healthy. Remind the children that to choose a healthy diet they should include:

- The main ingredient in your meals should be starchy foods such as wholegrain bread, pasta and rice
- Eat lots of fruit and vegetables, which means try to go for at least five portions of a variety every day
- Have some protein foods such as meat, fish, pulses, milk and dairy foods
- Eat fewer foods (and drinks) high in fat, especially saturated fat, sugars or salt.

Lead discussion about the nutrients that some of these foods provide – e.g. recap on information form lesson 1.

Activity 1 (20 minutes)

Put the children into groups (discuss with the teacher before the lesson the best way to go abou this). Give each group some food labels. Explain that you want them to read the food labels and copy the information onto the 'this is my traffic light system' worksheet (2A). If the group is of a higher ability then they can fill in the 2B or 2C worksheet.

Activity 2 (5-6min/group)

When some of the children have finished activity 1 (some groups can continue with Activity 1). Using the plastic food and 'The eatwell plate' floor mat, each group has three minutes to put as many of the foods in the rights section, as possible. The time of the exercise will be measured by the smiley face power-point presentation. When the group starts the exercise the smiley face power-point presentation will start. The clock runs for two minutes before the smiley face starts to move away from the 'eatwell plate', it takes one minute for the smiley face to completely move away from face. If it is more appropriate the groups do not have to do this exercise against the clock.

Activity 3 (20min)

Each child can design their own ‘eatwell plate’ for their favourite meal.

2A

I am

This is my traffic light system

A ________g serving provides

Traffic light labelling on the front of food tells you if it has high (red), medium (amber) or low (green) amounts of fat, saturated fat, salt, sugar and calories.

2A

I am

This is my traffic light system

A ________g serving provides

Traffic light labelling on the front of food tells you if it has high (red), medium (amber) or low (green) amounts of fat, saturated fat, salt, sugar and calories.

2B

Things to do:

1. What am I? (Draw pictures of the food in box 1 and 2)
2. Fill in the traffic light system as it appears on the food item.
3. Complete the nutrition boxes as it appears on the nutrition label

1

2

Traffic light labelling on the front of food tells you if it has high (red), medium (amber) or low (green)
amounts of fat, saturated fat, salt, sugar and calories.

It also takes into account the type of food. Explain this if you can

This is my traffic light system.
A g serving provides

This is my traffic light system.
A g serving provides

Name	Animal /plant	Fat/100g	Complex Carbohydrate (starch)/100g	Simple Carbohydrate (sugars)/100g	Fibre/100g	Protein/100g	Salt	Contains vitamins and minerals
1								
2								

Appendix 4

Lesson: Soluble / Insoluble materials and saturated Solutions – Year 6		
Name: Rosie Honeyman-Smith	Date: 31/01/08	Time:1.35-3.10
Learning Outcomes: Students should: • Understand and be able to explain the terms dissolving, soluble, insoluble and solution • Know that there is a limit to the amount of solid that can be dissolved in water • Understand that solutions can become saturated • Be able to design an experiment to demonstrate saturation of a solution	Reference to NC: Materials and Properties- Sc3 • Describe changes that occur when materials are mixed • That some solids dissolve in water to give solutions and that these changes are reversible **Sc1- several areas in scientific enquiry** Student Objectives: • Support pupils to plan their own experiment • Assessment of learning through observation	

Good learning outcomes

Content/ timings	Student (me) Input / Assessment	Resources and Support
Starter (10 min) Settle in and reacquaint with the children (group of 6). Recap – discuss with the children what they already have learned at beginning of week about this topic	Lead discussion and encourage the children to communicate what they have learned at the beginning of the week. Encourage all children to participate and recognize if any of the children having difficulties	Notes - IA Science weekly planner week beg:28/1/08 (outlines material already taught on topic)
Activity 1 (5min) **Only do this if it seems appropriate.** Children to read through and fill in the 'Mixing materials' sheet	Ask the children to work in pairs. Go through the answers as a group if necessary Be available to answer any questions	Science weekly planner week beg:28/1/08 'Mixing materials' sheet
Activity 2 (40-50min) Experiment	Demonstrate saturation experiment. Ask children to design their own experiment. Discuss carrying out a fair investigation	Science weekly planner week beg:28/1/08 Notes – IA Equipment for experiment see IA
Plenary (5min)	Ask the groups to communicate what they have found out in their experiment Add specific questions	Notes - IA
SATS questions (10-20min)		Science weekly planner week beg:28/1/08 SATS questions

Good recapping of previous knowledge

Good – assessment for learning

Differentiation		
High Ability	Medium Ability	Low Ability
This lesson plan is designed for the HA group	N/A	N/A

Suggest you highlight resources/ worksheets in a different colour.

Starter

Find out/recap what they already know about this topic (ask children to write short notes on the board) e.g. dissolving, soluble, insoluble and solution

Activity 2 – Saturation Experiment

1. Demonstrate dissolving sugar in warm water.
2. Ask the children what they think will happen if I keep adding the sugar to the solution. **The solution will become saturated.**
3. Ask the children to observe what happens once the solution has become saturated.
4. Ask the children to design their own experiment, working in groups of three.

   Questions:
   - Group 1 –Does a sugar solution become saturated more quickly if cold or warm water is used?
   - Group 2 - Which substance can you add **more of** to warm water before it becomes saturated, sugar or salt?

5. Give them different sized beakers, warm water, cold water, salt and/or sugar and something to measure it with. They can use whatever equipment they like.
6. **Discuss health and safety precautions with the children**
7. Recap on doing an experiment. Ask the children what they need to consider when doing an investigation/experiment **(e.g. fair test, repeat observation)** - resource1B (http://www.cgpbooks.co.uk/online_rev/ks2/science_page_01.htm)
8. Record experiment on A4 paper

Experiment (use as prompts if needed throughout the activity)

- Aim – What are you trying to find out
- Prediction – What do you think will happen
- Method – What you did and what equipment did you use
- Result – What happened? How will you record your results
  - can you show your results on a graph or table
- Conclusion - What is the answer to your question?

Plenary

Ask one child from each group to tell the rest of the group what they found out in their experiment

Appendix 5

Investigation – Teacher's Notes (these are to be used at the student/teachers discretion)

Introduction

Explain to the children that they are going to carry out an investigation and that they will be working as a team. Explain that I student/teacher will be there to guide them through the investigation but that it should be mostly their own work and ideas. Give the group a choice of questions. This will give them a chance to discuss which question they would like to investigate.

Questions

They will be investigating one of the following questions:

1. Does year 6 eat the daily recommended amount of fruit and vegetables?
2. Do girls eat more fruit and vegetables than the boys, in year 6?
3. Do boys eat more fruit and vegetables than the girls, in year 6?

Discuss why the investigation might be important…

- Discuss with the children why it is important to eat at least 5 portions of fruit and vegetables every day (see text box below).
- Ask them what they know already about this…
- Who says that we should eat this amount? How was this decided?
- Do they think that class 6 does eat the recommended allowance of fruit and vegetables
- Do they think it would be a fair test if they just guessed this or if they found out this information and record the results

Food Standard Agency Website

- Fruit and vegetables contain fibre and lots of vitamins and minerals that help keep the body healthy, yet many of us don't eat enough of them. In fact, average consumption is currently three portions a day, which is two short of the recommended figure of (at least) five portions a day.
- There is mounting evidence that people who eat lots of fruit and vegetables are less likely to develop chronic diseases such as coronary heart disease and some cancers.
- To get the health benefits of lower risk from diet-related diseases, we need to eat at least five portions of a variety of fruit and vegetables a day. So why not give children the chance of a healthier, fitter future by encouraging them to eat at least five portions of fruit and vegetables a day?
- The foundations of good health are laid down in childhood, so this is the ideal time to encourage an increase in fruit and vegetable intake.

The Project

The project will last for three weeks – in this time the group will have to:

- Discuss what will need to be considered for the investigation to work successfully
- What order they are going to do things in
- Decide how they are going to do the investigation
- Draw up a timetable
- Who will do what? It might be a good idea to record this information
- Carry out the investigation
- Present the investigation on a display
- Present their findings to the rest of the class

The Investigation

Discuss briefly what needs to be included in an investigation i.e. Aims, Introduction, Method, Results, Conclusion, Discussion. (Record on the board) The children have already covered this quite extensively.

Then go onto discuss each section in more detail, In regard to their investigation. The following notes are for the teacher to give guidance if the children are struggling

Aim

To investigate the following question…

1. Does year 6 eat the daily recommended amount of fruit and vegetables?
2. Do girls eat more fruit and vegetables than the boys, in year 6?
3. Do boys eat more fruit and vegetables than the girls, in year 6?

Introduction

Things that might be included:

- What the investigation is about
- Why they are doing the investigation
- What is the recommended amount of fruit and vegetables (for example; children aged 10-12)? Where will they find this information out? FSA, books, leaflets and other websites

- Why it is important that we eat the recommended amount of fruit and vegetables?
- What is a serving of fruit and vegetables? Where can you find out this information?

How (Methods)

How are we going to find out the answer to the question?

The children will need to decide through discussion:

- What they are going to do
- How they are going to do the investigation
- Things to consider:
- What information do they need to collect?
- Who in year 6 are they going to ask? Are they going to askall of the class or just a few
- When will they collect the info i.e. daily (people might forget what they have eaten)
- How long will they collect the data for i.e. a day, a week (what will make the test more fair)
- How they will collect the data
- Who will collect the data?

(I need to give guidance where appropriate)

Results

- How are the children going to record the results of the investigation e.g. in tables and graphs?
- It may be possible to add the data into a spread sheet on a computer and do the graphs on a computer

Conclusion

What was the answer to the original question?

Other things to consider

1. **How are they going to record / present their findings / results?**

- Who is going to do what i.e. write the introduction, results etc…

- Will probably need to make a plan
- How are they going to record the results
- Could present it on a display board
- Could do a presentation for the class

2. **If the group does not agree on something how are they going to resolve problem?**

3. **Resources**

- Computer room
- Internet – Food Standards Agency

4. **Discuss the appropriateness of the investigation (At the end of the project, if appropriate)**
   Ask the children if they can think of any ways the results may have not been accurate? i.e. children may have forgotten what fruit and vegetables they had eaten, so the results may not be accurate

Sc1 Scientific enquiry

Investigative skills

Planning

- ask questions that can be investigated scientifically and decide how to find answers
- consider what sources of information, including first-hand experience and a range of other sources, they will use to answer questions
- think about what might happen or try things out when deciding what to do, what kind of evidence to collect, and what equipment and materials to use
- make a fair test or comparison by changing one factor and observing or measuring the effect while keeping other factors the same

Obtaining and presenting evidence

- use simple equipment and materials appropriately and take action to control risks
- check observations and measurements by repeating them where appropriate
- use a wide range of methods, including diagrams, drawings, tables, bar charts, line graphs and ICT, to communicate data in an appropriate and systematic manner

Considering evidence and evaluating

- make comparisons and identify simple patterns or associations in their own observations and measurements or other data
- use observations, measurements or other data to draw conclusions

- decide whether these conclusions agree with any prediction made and/or whether they enable further predictions to be made
- use their scientific knowledge and understanding to explain observations, measurements or other data or conclusions
- review their work and the work of others and describe its significance and limitations.

Breadth of study

During the key stage, pupils should be taught the Knowledge, skills and understanding through:

- a range of domestic and environmental contexts that are familiar and of interest to them
- looking at the part science has played in the development of many useful things
- using a range of sources of information and data, including ICT-based sources
- using first-hand and secondary data to carry out a range of scientific investigations, including complete investigations.

During the key stage, pupils should be taught to:

Communication

use appropriate scientific language and terms, including SI units of measurement [for example, metre, newton], to communicate ideas and explain the behaviour of living things, materials, phenomena and processes

http://www.nc.uk.net/webdav/harmonise?Page/@id=6001&Session/@id=D_yTd9OV92E31DYVKvLsVu&POS[@stateId_eq_main]/@id=6419&POS[@stateId_eq_note]/@id=6435

Appendix 6

Rosie Honeyman-Smith Undergraduate Ambassador Scheme Nottingham University

School Teacher Testimony

1. At the start of my (UAS student) school placement it was decided through negotiation by Mrs S. Pearson and myself that I would teach the national curriculum to six or seven of the high ability children in class 7. One of the reasons for this was to give the children more individual time/attention with a student that has an understanding of science. Have you witnessed any evidence to suggest that the children have benefited from this?

The children in this group seem to have more confidence when discussing scientific concepts. They also appear to grasp new concepts more easily usually by relating it to prior learning or knowledge.

2. The children have been doing an investigation, which involves them working together as a team. They have also completed experiments which involved group work. Have you witnessed any evidence, in the classroom, to suggest that they have benefited from this?

This group of children have more confidence when designing an experiment. They are more able to discuss what they want to find out and know how to go about it. They can make predicts and observe and measure the results. They are more able to draw conclusions.

3. Between six and seven of the high ability children have had weekly science lessons with the 'Undergraduate Ambassador Scheme' student throughout terms 1 and 2 in 2007/8. Is there any evidence that there test/SATS results have improved as a result?

3 of the children have increased their SATs level by 1 sub-level
1 of the children has increased his SATS level by 2 sub-levels
The children all increased their SATS scores by between 3 and 13 marks.

4. Have you witnessed any other evidence to suggest that the children who have spent time in the classroom with the UAS student have benefited?

The children seem much more confident generally. In science they are more confident of their own ability and more ready to 'take a risk' when answering questions or tackling new work.