

# **BEST PRACTICE RESEARCH SCHOLARSHIP**

**SIR BERNARD LOVELL SCHOOL      GEOGRAPHY DEPARTMENT 2002  
DECEMBER 2002   -   SEPTEMBER 2003   DICK BATEMAN**

## **INTRODUCTION**

### **Aims**

The original plan, devised in October 2002, was to assess how well an ICT PowerPoint program of images and revision notes helped students in Geography to achieve successfully in our school's Key Stage 3 weather and climate Level Grade Assessment.

The precise aim was to see whether students in 9P learning by an ICT program alone, achieved higher grades relative to their Target Minimum Grades than a "control" class, 9E, who learned by conventional textbook and note taking methods.

### **Age Group**

Year 9 was targeted, as the year when National Curriculum Grade Levels have formally to be assessed by all Geography departments and reported to parents. An assumption is therefore that students are reasonably well motivated.

### **Hypothesis**

To examine this question a null hypothesis was useful. In order to dispassionately examine the subject area it is conventional to assume that there is likely to be no relationship between types of learning and achievement levels. Consequently the following sequence of null hypotheses were developed:

The hypothesis below was the original suggestion, as written in the Best Practice Outline of Research on 18.10.02

1. "That hands-on ICT E-learning will not improve Level Grade Assessment in Geography in Year 9 at SBL"

When the research scholarship was awarded this hypothesis was sharpened to:

2. "That hands-on ICT E-learning does not improve NC Level Grade assessment any more than conventional learning in Year 9 Geography"

This hypothesis was developed into a more quantitative form during the research planning. The eventual working null hypothesis became:

3. "That hands-on E-Learning using a PowerPoint program of images and revision notes does not lead to greater achievement, relative to Target Minimum Grades, than conventional textbook and note-taking methods."

A method of approaching this research in a quantitative manner has been imported from an Interactive Subject Initiative which I worked on in 2002. The idea is to award numbers to National Curriculum Grade Levels, as follows:-

7A	15	6A	12	5A	9	4A	6	3A	3
7B	14	6B	11	5B	8	4B	5	3B	2
7C	13	6C	10	5C	7	4C	4	3C	1

## **METHODOLOGY**

### **The Teaching and Learning**

In the conventional mode, 9E students were taught using the Weather and Climate chapter of the Key Geography Foundations textbook, discussing each section, answering the textbook questions so as to process ideas relevant to the assessment and taking notes to record their information.

9P, on the other hand, were given a freer rein to study a series of PowerPoint programs which I had created to give the class information directly relevant to the sort of questions they could expect in the forthcoming assessment. The three programs were entitled BestWeather L4, L5 and L6, and were entered into

Shared Files – Students – Geography

Level 7 and 8 aspirants were given verbal assistance within lessons and were asked to study independently.

Although tasks had been set within each program, students were given independence in how to study each program. They were allowed to work at their own pace and to record information in their own ways, including emailing the programs home to their own computer systems.

### **The Assessment**

Both sets of students were assessed by our tried and tested Level Assessment for this topic in November 2002. Level Grades were awarded to each student and are attached in the accompanying file.

The assessment scores, awarded as displayed in the Introduction, were entered into a Microsoft EXCEL file and are shown overleaf, in the Data Presentation section.

## DATA PRESENTATION

The columns show Target Minimum Grades (TMG) and Assessment scores. For example the top TMG for 9P is 6B, so that it is given a score of 11, as shown below.

7A	15	6A	12	5A	9	4A	6	3A	3
7B	14	6B	11	5B	8	4B	5	3B	2
7C	13	6C	10	5C	7	4C	4	3C	1

9P TMG	9P ASS	9E TMG	9E ASS	
	11	9	11	7
	11	10	11	7
	11	11	11	7
	11	11	11	9
	11	6	11	12
	11	12	11	10
	11	6	11	8
	11	6	11	8
	11	11	8	8
	11	8	8	5
	11	8	8	9
	11	11	8	10
	11	10	8	9
	11	9	8	8
	11	6	8	8
	11	5	8	8
	11	6	8	7
	8	12	8	7
	8	8	8	4
	8	8	8	8
	8	6	8	7
	8	6	8	5
	8	6	8	6
	8	9	8	6
	5	8	8	8
	5	5	5	5
			5	5
			2	6

## DATA PROCESSING

The mechanism devised to measuring achievement relative to Target Minimum Grades (TMG) is simple. Target Minimum Grades are assessed on a three-letter scale for each Level. Level 3C is the lowest grade for Level 3. 3B is higher than 3C as assessed by the grade criteria. 3A is the highest grade within Level 3. The next highest grade is 4C, then 4B, 4A and so on.

To quantify achievement, if a student reached his or her TMG the “score” awarded for research purposes would be zero. (For instance, a student with a TMG of 5C who achieved 5C)

A student achieving a grade one less than TMG (4A rather than a TMG of 5C) would score -1.

Similarly a student achieving a grade one higher than TMG (5B rather than TMG 5C) would score +1

Firstly students each class were sorted into their from 9P were “matched” with students from 9E with the same TMGs to give two arrays of 17 students of similar past achievement.

Next the assessment achievements were recorded, and then the scores relative to TMG (ie 9P DIFF – meaning differences) were calculated by simple addition or subtraction to give an achievement array for each class.

For a simple measure of how well or badly each class had done, the assessment scores relative to TMG (9P and 9E DIFF) each achievement array were simply added together, as shown in the table below.

9P TMG	9P ASS	9P DIFF	9E TMG	9E ASS	9E DIFF
11	9	-2	11	7	-4
11	10	-1	11	7	-4
11	11	0	11	7	-4
11	11	0	11	9	-2
11	6	-5	11	10	-2
11	12	1	11	12	1
11	6	-5	11	8	-3
11	6	-5	11	8	-3
8	12	4	8	8	0
8	8	0	8	5	-3
8	8	0	8	9	1
8	6	-2	8	10	2
8	6	-2	8	9	2
8	6	-2	8	8	0
8	9	1	8	8	0
5	8	3	5	5	0
5	5	0	5	5	0
		-15			-19
		out of 17			out of 17

The table also shows a more sophisticated comparison. The two assessments scores relative to TMG (9P and 9E DIFF) for each achievement arrays were entered into Microsoft EXCEL and then correlated, using the sequence:

**INSERT – FUNCTION - STATISTICAL – CORREL.**

The expectation was that there would be a 1.0 correlation – that the higher the achievement of 9P students, the higher the achievement would be for 9E students, in other words, both groups would do equally well, or badly.

9P TMG	9P ASS	9E TMG	9E ASS
11	9	11	7
11	10	11	7
11	11	11	7
11	11	11	9
11	6	11	12
11	12	11	10
11	6	11	8
11	6	11	8
11	11	8	8
11	8	8	5
11	8	8	9
11	11	8	10
11	10	8	9
11	9	8	8
11	6	8	8
11	5	8	8
11	6	8	7
8	12	8	7
8	8	8	4
8	8	8	8
8	6	8	7
8	6	8	5
8	6	8	6
8	9	8	6
5	8	8	8
5	5	5	5
		5	5
		2	6
Correlation 9P&9Eass	0.287		
	0.286708		

## DATA INTERPRETATION

The simple arithmetical comparison between the two groups indicates that:-

1. Both arrays had negative scores, showing that the comparable students had not yet reached their TMGs.
2. The 17 9P students had an aggregate score of -15, showing that they were 15/17ths of one-third of a Level Grade below their TMG (ie. For an average TMG of 5A their average assessment score was just over 5B)
3. The 17 9E students had an aggregate score of -19, showing that they were 19/17 of one third of a Level Grade below their average TMG (ie for an average TMG of 5B their average assessment score was just below 5B.)

The correlation coefficient between the two arrays was +0.287. For an array of 17 pairs this gives 15 degrees of freedom, which would require a correlation coefficient of +0.45 or so to be significant at the 95% probability level.

The correlation coefficient of +0.287 is nowhere near that and can only be regarded as a slight positive correlation, tending to show that there is a random element between the two arrays. In other words there was likely to be more at play than simply past achievement (the TMG) in what caused the assessment marks to take this form.

## CONCLUSIONS

1. The null hypothesis,

“That ‘hands-on E-Learning’ using a PowerPoint program of images and revision notes does not lead to greater achievement, relative to Target Minimum Grades, than conventional textbook and note-taking methods.”

- is **not** proven, as the evidence from arithmetical technique suggests that 9P, the dominantly ICT-using class did a little better than 9E, the dominantly “conventional-learning” class.

2. There is no definite evidence that ‘hand-on E-learning’ in this research programme was responsible for 9Ps better results.

## EVALUATION

In this simple comparison of two classes with two different learning styles a number of considerations are bound to limit the value of any conclusions.

### Reliability of Method

1. Although the premise was that one class would have access to computers for all their lessons, this was not practical, though they had computer use for 6 out of the 9 lessons involved in the research period. During the other three lessons they were encouraged to research on their own from textbooks, with peer support from their friendship groups. At least one of these lessons was cut short by undesirable behaviour which required silent individual study. Consequently the conditions of “pure” ICT learning were not met, though a reasonable attempt was made to give a predominantly ICT E-learning “feel” to the sequence of lessons.
2. Similarly, with ICT programs on offer, it seemed a shame to deprive 9E of any ICT contact at all, so I allowed the class to learn from the programs for 3 of their 9 lessons. Again this could not be said to be a “purely” conventional experience, but was much less distinctively ICT-rich than 9P’s learning.
3. Although the “purity” of the research might have suffered, I think that the exposure of 9E to E-learning was justified because in normal conditions within a secondary school timetable it will be inevitable that one class will have more access to computers than another. The ideal school does not exist, so this is research in reality.
4. It will be obvious to any practising teacher that the behaviour of classes and of teachers changes from lesson to lesson. Consistency is a great, but rare virtue in both cases. Consequently learning will have been more efficient in one class in some lessons and the other class in other lessons. This will have had a real effect on achievement and there are a great many uncontrolled factors, not least concerning disruptive students, which could well have modified the eventual results. In my judgement, however, I would say that 9P were typically 9P and 9E behaved, on the whole, like 9E usually do. The real question is “Would 9E would have done better than 9P if the roles had been reversed?” I could not find a way of doing this, however.

### Reliability of Assessment, Marking and Raw Results

1. The assessment itself was a conventional written one, so the results were likely to be as reliable as any of my other Key Stage Three results would be.
2. On reflection it would have been useful to have swapped marking with another geography teacher who did not know the background to the study, so that their marking might have therefore have been more secure.

### Reliability of Data Interpretation

1. The sample, of just two classes, was very small, and the sampling device of matching students according to TMG limited the sample to just 17 pairs, not enough for any more than a pilot study, so any conclusions must be very cautious. There may be scope, after reflection on the conclusions, for extension of this research method on an extended scale.
2. Perhaps there is a better way to create the matched sample, with slightly more representative pairs (but I could not think of one).
3. The arithmetical totals are likely to be a correct reflection that 9P did better overall than 9E. Whether this was the nature of the two teaching and learning styles is not proven or disproven, but it would seem to be the most likely criteria causing the difference between the 17 matching pairs.
4. The correlation is likely to be correct, being a tried and tested method in this subject area. The result showed the varied individuality of students within the two arrays

### Reliability of Conclusions

1. . The tendency towards a random correlation result indicates that though there is a slight link between past high scorers scoring highly on this assessment, there are one or more variables, which is working against that trend, one of which could well be the learning style difference.
2. The arithmetical superiority of 9P in the assessment may have been due to their 'hand-on E-learning' style. Other factors might have been at play, however. For instance, more of the 9P students in the matched pairs might have responded more sympathetically to me as a teacher than those in 9E, though, in reality, I would not have thought so. Nevertheless, in a typically human environment like teaching and learning, many factors are always vying for effect.

## **EVALUATION BY STUDENTS IN 9P**

After the assessment, 9P were given a questionnaire designed to find out:-

- How well they had enjoyed the ICT work and
- How well they thought they had learned compared with normal lessons..

The students were asked to fill in tick boxes graded from Very positive to very negative, as shown in the attached questionnaire. They were also asked to write their own reasons for their answers. A mini-test was given to see what their memory of key words was like.

## **BIBLIOGRAPHY**

- 1 Key Geography Foundations by David Waugh and Tony Bushell, pub. Stanley Thornes 1995 pages

## **FURTHER THOUGHTS**

1. After this pilot study, much more reading of available research material is required. My original search was perfunctory, It would be interesting to see what academic studies, if any have been made.

2. More professional development is required for me to learn how to turn my PowerPoint programs into more effective learning resources. I have contacted Rick Cope of Backwell School, who is an experienced E-learning author and he has agreed to help in this area.

3. Much more discussion is needed between researchers and E-learning managers to discuss our findings, tentative as they are. To this end, in February 2003, I requested such a meeting (see attached note) with SBL teachers Tony Booth, Dave Baker, Nigel Varley and Ruth Cole – all of whom are relevant researchers and/or managers.

4. A larger study, possibly using Hazards PowerPoint programs might be possible, though timings would be a problem as we usually complete this topic in the Spring Term, and I may not have seen Rick Cope by then. Perhaps the Rivers topic in the Summer Term might be possible, though it would need more development time to create the PowerPoint programs. It may be better to further develop the Weather and Hazards programs after discussion with Rick Cope and the other researchers in SBL

### **DISSEMINATION**

1. In my application for this scholarship I mentioned “Weather” and “Teaching Geography” as two publications which may be useful vehicles for dissemination. I am prepared to do this but the sample of students may be too small for publication. This draft may be suitable for publication in the SBL journal, “Learning Matters” and for circulation around Geography Departments in the South Gloucestershire Cluster.

2679 words    Dick Bateman SBL

February 2003