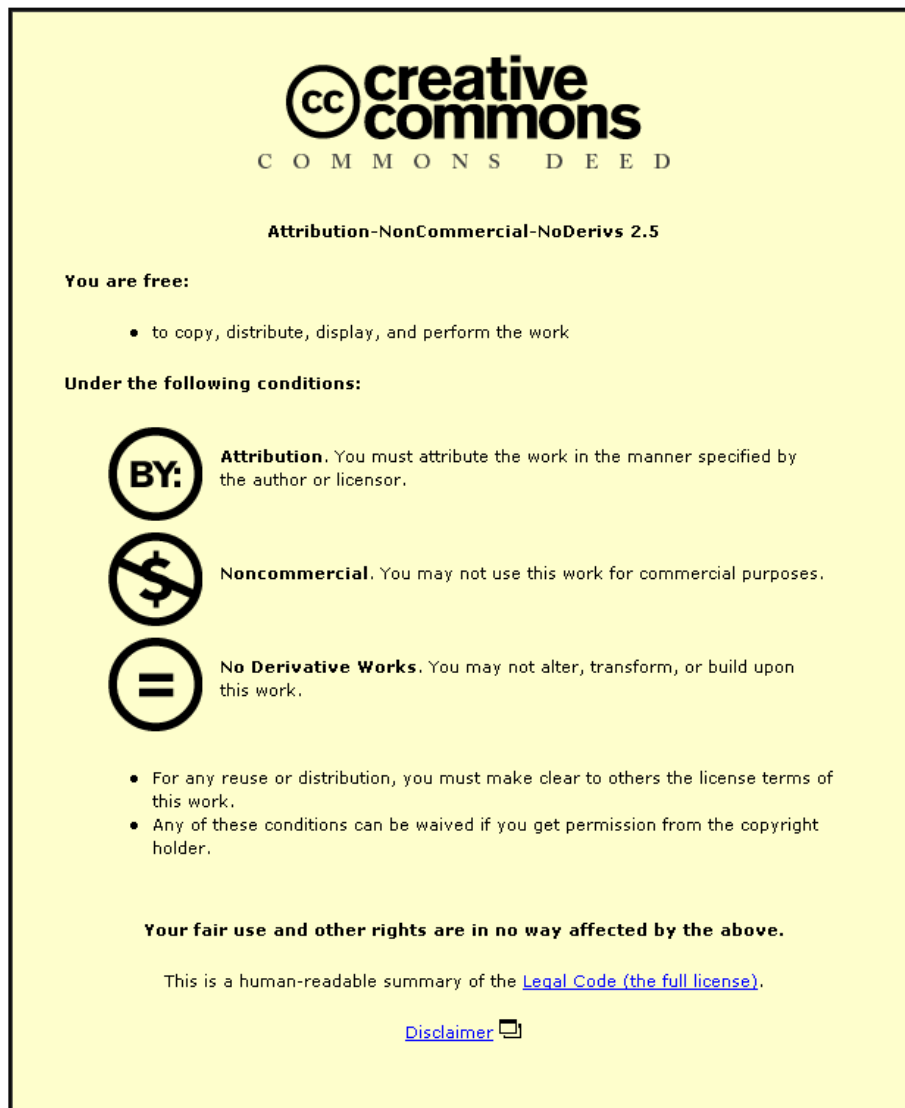




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AN EXAMINATION OF THE RELATIONSHIP BETWEEN GENDER AND ACHIEVEMENT AMONGST 'A LEVEL' STUDENTS WORKING ALONE OR IN PAIRS

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Abstract

This study examines the interaction between gender and the effect on student learning of working alone or in either single or mixed sex pairs. 68 A-level students (mean age 16.8 years), all attending mixed sex schools, took part in a task which incorporated a number of basic learning processes. They worked alone or in either in single or mixed sex pairs. It was found male students got more answers correct when they worked with females, than when they worked alone. It was found that, in mixed sex pairs, both male and female students gave less wrong answers than did individuals. In addition, females had more confidence in their correct answers when working with males, than when working with other females, or alone. It was suggested there could be advantages under some circumstances, in mixed sex working for both male and female students.

Key words: achievement, confidence, gender, paired working, students

In spite of evidence of the success of single sex working the benefits of single and mixed sex schooling is a controversial issue. Support for single sex schooling is offered, for example by Tyrer (1999), who in a two year study of the Aylesford school in Warwick found boys, in an age range from key stage 3 to GCSE (approximately 14 to 16 years of age), raised two or more levels in their grades when taught in single sex classes. Higher levels of achievement were also found by Warrington and Younger (2001), with students in single sex classes. They explained this as being due to girls and boys having different learning styles, which single sex schooling allows to be taken into account. In addition, they noted a gender specific motivational structure is more possible in single sex schools and, of course there are many other possible explanations. An alternative view about the merits of single and mixed sex schooling is promoted by researchers such as Jacklyn (1989) who highlighted the influence mixed or single sex group work can have on self-image. Kovacs et al (1996) adds to this view noting, one of the benefits of working with other-sex peers included being more socially skilled, and popular. The current study is however intended to move from the broad educational debate about single and mixed sex schooling and to focus on the actual learning process with individual students.

The issue of working alone or with others either in mixed or same sex pairs involves a number of variables including the interaction itself. Hinsz (1990) argues group performance is likely to improve on that of individuals, as more participants have greater intellectual assets than single students. Frank (1986) explains individual group members may perceive different aspects of the material as being important or interesting, and use 'hooks' to remember these. More material may therefore be available for pooling later. Stephenson et al (1986), looking at another aspect of group behaviour, found that group members are more certain about their memory of material than are individuals, regardless of the accuracy of that recall. This is important from the teacher's point of view, for material learned inaccurately by an overly confident student can be counterproductive in the long run. The self confidence of the student in the learning process is one factor which will be examined in the present study. Kohler et al (1985) found, that allowing pupils to work together was an effective means of encouraging a positive, achievement-orientated atmosphere. In addition, Meece et al (1990) found, that students who viewed themselves as incompetent or lacking in ability, tended to avoid demanding tasks and displayed less persistence in work habits. More recently, McGrath and Repetti (2000) noted the importance of expectations, and found children's opinions about their academic competence were closely linked with behaviours critical for academic success. Working with others can, however, have its downside. The experience of many teachers and research from, for example Prior (1995), would caution against regarding group working too positively, noting there are many occasions when students work better alone.

Gender differences in attainment may also interact with individual group working. Girls have outperformed boys in their attainment at school at every age, from seven to eighteen years, according to Tooley (2003) and the Office of National Statistics (2003). This is particularly noticeable in the school league tables where single sex schools for girls have recently been taking the top positions. There are, of course, a number of possible explanations for this including the selection process itself. The concern about the underachievement of boys should not however, according to Arnot, David and Weiner (1996 p. 162), produce an overreaction by 'concluding that boys are now the educationally disadvantaged sex'. A number of explanations for the underachievement of boys have been offered, which may not be linked with single sex schooling. Stephen Byers, when he was the School Standards Minister, argued that boys had adopted an anti-learning culture, where taking part in school work was regarded negatively (Lightfoot 1998). Jackson (2002) takes this further, by suggesting that "laddishness" is actually a means of self-protection, covering up for lack of ability, or from appearing feminine. Clare (1997) offers an additional explanation for the achievement of girls and the underachievement of boys, based on the style of the National Curriculum. The emphasis is on coursework and continuous assessment, both of which are educational strategies with which, he suggests, girls tend to have a closer affinity than boys. A number of other researchers including Arnot et al (1998), however, contest this view.

An integral part of the debate over single/mixed sex schooling is the dynamics of working with members of the other sex. Studies conducted over many years, have consistently shown (e.g. Brophy and Good 1974; Sadker and Sadker 1994), that at all levels and in all subjects, females had fewer opportunities than males to interact with teachers in mixed sex classes. Carli (1990) found for example, when mixed and same sex pairs were discussing a subject about which there was disagreement, females in mixed pairs spoke more tentatively than males. Midwinter (1992) found males tend to be more direct than females, who tend to try to establish rapport before pursuing their intentions. More recently, Baxter (2002) noted in her study that boys interrupt and take over the conversation from girls.

The aim of the present study, is to look at the learning process bringing together the relationship between individual and paired working and gender differences.

It was hypothesised:

- a. males and females working in same sex pairs would be more accurate than those working in mixed sex pairs (following Tooley 2003).
- b. pairs would answer more questions correctly than would those who worked as individuals (following Hinsz 1990).
- c. females working in same sex pairs would be more confident in their responses than those working in mixed sex pairs. This follows from the argument that males dominate interactions (Carli 1990; Baxter 2002).
- d. pairs would be more confident their responses were correct than individuals (following Stephenson et al 1986)

METHOD

The present study examined single and paired performance on a specific task in order to look closely at how this affects the learning process. The participants were all from mixed sex schools, so experience of working with members of the other sex was similar for all. The teacher/student interaction was controlled by using a tape recorder for information input. This ensured the differing style of attention noted by Baxter (2002), where teachers respond more readily to boys, was not an influence. The task did not involve a great deal of preparation like coursework often does, nor was there an opportunity for "cramming". Hence neither of the special abilities of males, or females, was likely to influence the results. The participants were developmentally of an age to be more socially skilled with the other sex than the younger students included in previous studies such as that of Tyrer (1999) who looked at pupils from key stage 3 up to GCSE (approximately 14 to 16 years of age).

The task

This used included a learning processes which consisted of factors such as: information input, discussion, memory storage and recall under test conditions. These are all important skills required for many types of academic attainment. The task consisted of listening to a narrative concerning people doing something in a situation, which in each case, involved a relationship and active behaviour. . The narratives were not related to any of the 'A-level' subjects the students were taking. This was intended to ensure that some were not more able through prior knowledge or familiarity, to 'chunk' the information

portrayed (Chi 1978). The task was designed to ensure there was no bias towards the interests of males or females to take into account reported links between gender and success in certain subject areas. There was no significant difference in the performance on the task between male and female students when they worked alone, as can be seen in Table 1. This indicates this aim was achieved.

Table 1

Showing scores, as a percentage, on the three measures between students working alone, and the results of the test for significant differences.

Conditions	Mean scores	Standard deviations	t scores	Probability
Correct answers				
Males alone n=9	32.23	9.47	0.35	.72
Females alone n=11	34.00	11.12		
Wrong answers				
Males alone n=9	43.78	7.50	0.81	.57
Females alone n=11	40.67	9.41		
Confidence				
Males alone n=9	3.79	0.48	0.59	.57
Females alone n=11	3.65	0.54		

The Participants:

68 students, with an average age of 16.8 years, took part in the study on a voluntary basis. They consisted of 33 males and 35 females, and the study was carried out at the end of the second term (January to March) of their first year of their two year 'A-level' courses. In order to control for any selectivity involved in attending single sex schools or colleges the three institutions participating in the study were all co-educational. A sociogram of friendship patterns in each class used in the study was conducted. All groupings were allocated on a random basis, except that all friendship pairings, on the basis of the responses to the sociogram, were eliminated. Koomen (1988) found, friendship patterns affect participation within groups, and thus, this was a necessary control. A total of 7 volunteers were excluded from the sample for this reason. The ones asked to leave were selected at random, by drawing lots between those who were in a particular friendship grouping.

Procedure:

In groups of twelve, the students were informed that they were to take part in an experiment concerning learning and memory strategies, which would take about an hour of their time. They were seated together around a single table, and were then presented with a narrative record of an event. To ensure there was no interpersonal interaction between 'teacher' and student, this was played on a tape recorder. To ensure that any results were not an outcome of the material used five different narratives were included in the study. One narrative selected at random was used twice as six groupings of twelve subjects were included in the study.

Whilst each 20 minute narrative was being played the students were instructed not to make notes, communicate with each other, nor ask the experimenter questions. After the narrative had been played all participants, still seated in a group, were given a distracter task. This took about five minutes to complete, and then they were randomly divided into the experimental groupings. Four male and four female students were randomly allocated either into single or mixed sex pairs, forming four dyads. The remaining two male and two female students worked alone. There were fewer students in this individual condition in two of the sessions owing to the necessity, as explained previously, to dismiss some of the sample as they knew others in the group.

The dyads were then each placed in one of four rooms to complete a summary of the narrative. The individuals were placed together in a large room and were told not to communicate. They were also informed that the door would be left open in order that the experimenter in 'the next room could check that they did not discuss the task'. All the students were instructed to complete, within thirty minutes, as comprehensive a summary of the narrative they had heard as possible. To ensure the pairs worked together and not in parallel, those working in pairs were instructed to complete one summary between them. Each of the individuals working alone was instructed to complete a summary.

At the end of the thirty minute session the summaries were removed 'for checking', and all the subjects were individually given the test questions. There were approximately twenty five of these for each narrative, and they were instructed to answer them individually, without any collaboration. This task was completed in a single large room with the experimenter present. They were not permitted to refer to any notes or their summaries whilst doing this task. In addition to answering the questions, they were asked to complete for each question, a five point scale of confidence in their answer. This ranged from 'guessing' through 'fairly sure' to 'certain'. After completion of the experimental session the pupils were debriefed as a group.

Data analysis:

The number of totally correct answers from the short answer tests were scored and recorded as a percentage. This was to ensure equality between different narratives as the number of questions for each varied slightly. The number of wrong answers were scored and recorded as a percentage. These were those that were clearly wrong or actually contradicted the correct answer.

The number of partially correct responses were scored including answers which, whilst not literally correct, did not actually counteract the correct version. They were not included in the analysis as the main interest was in the learning process. Correct answers aided this, and totally incorrect answers could hinder it. Answers which were partially correct or had correct elements in them, could not legitimately be considered to do either. For control purposes this data was analysed in the same manner as the correct responses and no significant differences emerged between any pair of comparisons.

Answers for each test were scored by two independent markers selected from a panel of four. There was 94% agreement for correct and partially correct answers and 87% agreement for wrong answers.

Confidence responses were scored on a scale from one to five, the highest score being the most confident.

The short answer test results and the scores on the confidence scales were compared between males and females within each experimental condition, namely same sex, mixed sex, or individual. This was done by means of 't' tests for unrelated samples on SPSS.

RESULTS

The first hypothesis that males and females working in same sex pairs would be more accurate than those working in mixed sex pairs, was not supported by the data, as can be seen in table 2.

The second hypothesis, that the pairs would answer more questions correctly than would those who worked as individuals, is only partly supported. As can be seen in table 2, males working as a pair with a female were significantly more likely to be correct than those who worked alone. This did not occur with the females.

Table 2

Showing scores, as a percentage, for correct answers, and the results of the test for significant differences

Conditions	Mean scores	Standard deviations	t scores	Probability
Female pairs n=12	37.17	12.56	0.64	.54
Alone n=11	34.00	11.12		
Females in				
Mixed pairs n=12	40.42	12.16	1.32	.20
Alone n=11	34.00	11.12		
Female same sex n=12	37.17	12.56	0.64	.53
Female mix. Sex n=12	40.42	12.16		
Male pairs n=12	38.67	13.63	1.19	.25
Alone n= 9	32.33	9.47		
Males in				
Mixed pairs n=12	43.92	9.79	2.72	.01*
Alone n= 9	32.33	9.47		
Male same sex n=12	38.67	13.63	1.08	.29
Male mixed sex n=12	43.92	9.79		

If the data is examined in terms of wrong answers, rather than the number of correct answers, there is some support for the second hypothesis. In table 3, it can be seen that individuals of both sexes got less answers wrong when they worked as a pair with a member of the other sex, than when they worked alone.

Table 3

Showing the scores, as percentages, for the wrong answers, and the results of the test for significant differences.

Conditions	Mean scores	Standard deviations	t scores	Probability
Female pairs n=12 Alone n=11	35.75 40.67	9.87 9.41	1.21	.24
Females in Mixed pairs n=12 Alone n=11	28.86 40.67	9.63 9.41	2.97	.002*
Female same sex n=12 Female mix. Sex n=12	35.75 28.86	9.87 9.63	1.74	.09
Male pairs n=12 Alone n= 9	39.25 43.78	8.73 7.50	0.76	.52
Males in Mixed pairs n=12 Alone n= 9	28.83 43.78	12.30 7.50	3.21	.005*
Male same sex n=12 Male mixed sex n=12	39.25 28.83	8.73 12.30	1.61	.12

The third hypothesis is rejected, and indeed the results are the opposite to what had been predicted. As can be seen in table 4 the females who worked as a pair with a member of the other sex were more confident of the correctness of their responses than those working in same sex pairs, or alone. For the males, there were no differences in the amount of confidence, regardless of whether they worked as a pair or alone.

The fourth hypothesis, that pairs would be more confident than individuals, is not supported as there is no significant difference other than that described above between the females working in a mixed sex pair with the other two female experimental groupings.

Table 4

Showing student's confidence their answer is correct, and the results of the test for significant differences

Conditions	Mean scores	Standard deviations	t scores	Probability
Female pairs n=12 Alone n=11	3.56 3.65	0.56 0.54	0.39	.69
Females in Mixed pairs n=12 Alone n=11	4.03 3.65	0.28 0.54	2.12	.04*
Female same sex n=12 Female mix. Sex n=12	3.56 4.03	0.56 0.28	2.60	.02*
Male pairs n=12 Alone n= 9	3.95 3.79	0.53 0.43	0.71	.51
Males in Mixed pairs n=12 Alone n= 9	3.88 3.79	0.37 0.48	0.49	.63
Male same sex n=12 Male mixed sex n=12	3.95 3.88	0.53 0.37	0.36	.72

DISCUSSION

The findings of this study do not support the view that same sex working is necessarily always the route to academic success. The study, it must be stressed, is concerned with the learning process specifically involving information input, discussion, memory storage and recall under test conditions. In some respects this task, because of the need to implement experimental controls in this study, is different to what pupils would experience in their normal 'A level' work. This rarely involves paired work taking place under 'test conditions', and often involves more complex learning outcomes. This is not necessarily the same as looking more broadly at single sex schooling in relation to the school league tables. Many additional variables can have an influence on this. The data produced in this study suggests, for both male and female students, working in mixed sex pairs can have a positive impact on the learning process. The test results based on the number of correct answers have shown a better level of performance for the male students who were paired with a female, compared to those working individually. An equally important finding is that with this learning task there are less errors made by mixed sex pairs, than when students work as individuals. This seems to provide some educational justification for pairing students in their work. This finding can be explained by referring to other research by, for example Hinsz (1990), which indicated that by working with others the intellectual assets available are greater. This can have an impact on the learning process. It is important for teachers to appreciate working in pairs can improve performance, not only by encouraging learning through exploratory talk, but also in other ways. This study does highlight reduction in errors as an important measure. It is not one commonly employed by teachers as a yardstick of performance, largely because it is normally so difficult to identify. It is however a measure, which is important in the learning process as it can reduce the likelihood of faulty learning in the long term. It is useful for teachers to know that errors can be reduced by mixed sex paired working. In a task where making errors can be a hindrance to learning, it may be advantageous to plan for mixed sex working.

The results of this study would suggest working together can have advantages for both male and female students working together. It does need to be emphasised that the students who took part in this study were considerably older than those in the Tyrer (1999) study which reported on the advantages of single sex working. The students who participated in the present study would therefore be likely to be developmentally more advanced, and thus more comfortable working with the other sex. Mixed sex paired working may not be appropriate for younger students. It should also be noted that the pairs were established for this one task only, and friendship pairs were specifically excluded.

Initially it may seem that males gain more than females from mixed sex working which links neatly with other research findings which show males dominate interactions in the classroom (Carli 1990, Baxter 2000). In the present study, male students working with female students, produced more correct answers than those who had worked alone. If the test results based on correct responses only were considered as a criterion, the teacher may believe that mixed sex working would have little advantage for their female students. This is the conclusion, based on academic performance, that Marston (1993) notes has been drawn by some schools. If other aspects of the learning process are taken into account, a different picture merges. Female students, as well as making less errors, appear to have more confidence in their test answers when paired with males than when working in single sex groups. Self-confidence is central to much success in school, and according to Fontana (1994), is worth encouraging under most circumstances. On this measure, there is therefore good reason to encourage mixed sex working with girls, as well as with boys. It is too easy to look solely at performance indicators, and to forget there is far more to be gained from education than high marks. The advantages for girls of working in mixed sex pairs may well not appear in the form of marks. It may, as shown in the present study, emerge in a more subtle but nevertheless in an extremely important manner.

From the point of view of the teacher this study would suggest there are educational justifications, under some circumstances, for having students work with members of the other sex rather than the same sex, or on their own. Finally it would seem that, certainly with a simple learning task, no disadvantages have been identified in the present study as a result of working as one of a mixed sex pair.

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