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Chapter 13

Classroom seating arrangements and classroom behaviour

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While there has been recent renewed interest in classroom seating arrangements (Kern and Clemens (2008); Wannarka and Ruhl (2008)), seating arrangements and their effects on student behaviour have been studied for more than 80 years (see Dawe (1934); Griffith (1921); Schwebel (1969); Shores and Haubrich (1969); Wheldall, *et al.* (1981)). More recent studies of classroom seating arrangements completed since the late 1970s have provided important new insights into their effects on classroom behaviour involving a variety of different populations and settings. Populations studied have included regular students, children with mild, moderate and severe disabilities, and children with emotional and behavioural disorders, as well as their teachers. Studies have been conducted in regular and special schools at the primary and secondary level in the United Kingdom, the United States, Australia and Germany.

As anyone educated in school prior to the 1960s will recall, the norm for classroom seating was for students to be seated in rows facing the teacher, whose desk and blackboard were traditionally situated at the front of the classroom. This all changed with the publication of the Plowden Report on primary education in 1967 (Department of Education and Science 1967). The Plowden Report, reflecting the progressive mood of the times, argued that traditional classroom seating in rows should be eschewed in favour of small groups or table clusters (table groups) (Wheldall and Glynn 1989). Supposed benefits of small-group settings included strengthening the possibility of individual education programmes through increased individual teacher attention, albeit within a small group of students of similar academic achievement (Bennett and Blundell 1983). Groups also provide the opportunity and encouragement for students to socialise, for only with continued peer interaction, it was believed, could effective learning take place (Wheldall and Glynn 1989).

Table groups were also believed to provide a more effective means for students to participate in group work. The benefits of group work were thought to include an opportunity, as Bennett and Blundell (1983: 93–4) put it:

> to learn to get along together, to help one another and realize their own strengths and weaknesses, as well as those of others. They make meanings

> clearer to themselves by having to explain them to others and gain from opportunities to teach as well as to learn. Apathetic children may be infected by the enthusiasm of a group or could sit back as idle passengers, a danger the teacher must watch for. Able children, on the other hand, benefit from being caught up in the thrust and counterthrust of conversation in a small group of children similar to themselves.

The majority of primary teachers readily adopted the recommendations made by the Plowden Report (Department of Education and Science 1967) with respect to classroom seating arrangements, and classroom seating in table groups became the norm in spite of the lack of any empirical research evidence supporting these recommendations (Bennett and Blundell 1983; Hastings and Schwieso 1995; Wheldall, *et al.* 1981).

The ORACLE observational study of primary school classes carried out in the UK in the 1970s, however, highlighted some of the inconsistencies between seating arrangements and teachers' intentions (Galton, *et al.* 1999). Children are required to sit in groups around tables, but are seldom asked to collaborate. Hastings (1995) concluded that cooperative learning tasks are, in fact, quite rare while Bennett, *et al.* (1984) found that a large part of the social interaction observed in table groups was, quite simply, non-work related.

The aim of this chapter is to review the extant *experimental* research literature on classroom seating arrangements and their effects on student classroom behaviour, with particular reference to comparisons of rows and table groups seating arrangements.

Spatial density

In one of the earliest experimental studies of classroom seating, Krantz and Risley (1977) evaluated the effects of spatial density on the behaviour of kindergarten children. Crowded and less crowded seating arrangements were systematically manipulated and observed during story sessions and teacher demonstrations. Masking tape was used to map out spaces two feet apart for the less crowded condition and a small blanket defined the area for the crowded condition. On-task behaviour was operationally defined as 'sitting cross-legged, with visual attendance to the teacher and/or book during a story, and not engaging in disruptive behaviour'. Observations revealed that the level of on-task behaviour was significantly lower in the crowded condition. Not only did the less crowded condition enhance on-task behaviour, but the frequency of disruptive behaviour was also reduced to levels achieved only by the systematic use of contingent reinforcement (praise and classroom privileges) during the crowded condition.

Same-sex versus mixed-sex seating

Wheldall and Olds (1987) carried out an experimental study with third- and fourth-grade students to determine whether a mixed-sex seating arrangement would produce clear effects on the on-task behaviour of two primary school classes. An ABA design was used where the participants of both classes were observed for two weeks in their usual seating positions. This was followed by a two-week intervention phase, and then a reversal phase with participants seated in their usual seating arrangement. During baseline, the Year 3 participants sat in their usual arrangement of three table groups for boys and three table groups for girls. During intervention, the boys and girls were mixed so that boys and girls were now sitting next to each other in table groups. In the fourth-grade class, the children were initially seated in their usual arrangement of three rows of double desks and next to a member of the opposite sex. During intervention all participants sat next to a member of the same sex.

On-task behaviour in the fourth-grade class (where participants were normally seated in rows next to a member of the opposite sex), decreased by 14 per cent from 90 per cent to 76 per cent when seating arrangements were changed to same-sex seating. During the reversal phase, on-task behaviour increased by 13 per cent to 89 per cent. Also, the mean levels of participant disruptions increased from 10 during baseline, to 19 during intervention, and then fell to 8 following the return to baseline. In the third-grade class (where participants normally sat in table groups next to a member of the same sex), on-task behaviour increased by 17 per cent (from 75 per cent to 92 per cent) when participants changed their seating arrangement to sit next to someone of the opposite sex. On-task behaviour fell by 25 per cent (from 92 per cent to 67 per cent) when same-sex seating was reintroduced in the reversal phase. Also, the level of participant disruptions fell from 22 during baseline to 11 during intervention and increased to 41 during the return to baseline. Thus, mixed-sex seating produced the highest levels of student on-task behaviour and the lowest levels of participant disruptions. Moreover, what emerged clearly from the results was that children with the lowest on-task study levels were most positively affected by the change from mixed-sex to same-sex seating.

Rows versus table groups during independent work

Most studies of classroom seating arrangements, however, have compared the effects of rows versus table groups on classroom behaviour when students were required to complete individual work. All studies consistently revealed appreciably higher levels of on-task, work-related behaviour when seating was arranged in rows. These studies are described below.

The seminal study by Axelrod, *et al.* (1979) examined the effects of classroom seating arrangements in two United States elementary schools. They compared the impact of a table groups arrangement and a rows arrangement on the

on-task behaviour and the total number of 'talk outs' of second- and seventh-grade American students. The subjects in the first study were 17 second-grade academically below-average students. Study behaviour was operationally defined as orientation toward the appropriate material, attention to the teacher when the teacher was speaking, complying with teacher requests, raising a hand for teacher assistance, and being out of one's seat with teacher permission. An ABAB design was employed in which seating in table groups (A) alternated with seating in rows (B) at fortnightly intervals. Mean percentage on-task behaviour was 62 per cent during table groups 1 and rose to 82 per cent during rows 1, decreased to 63 per cent during table groups 2, and then rose again to 83 per cent during the final rows 2 phase. Rows promoted higher levels of on-task behaviour in 16 of the 17 students included in the study. The results clearly demonstrated that the participants achieved higher levels of on-task behaviour when participants were seated in rows compared with when they were sitting around tables during independent seat work.

In the second study, which employed an ABA design, Axelrod, *et al.* (1979) compared the impact of table groups and rows seating arrangements on the disruptive behaviour (number of talk-outs) exhibited by 32 seventh-grade school students of average ability. The dependent variable, 'talk outs', was defined as any audible, verbal sound made by a student without the teacher's permission. Talk-outs were counted as separate responses if there was at least a three-second lapse between successive talk-outs. Talk-outs averaged 58 per cent in table groups 1, 30 per cent during rows 1, and 50 per cent during table groups 2, demonstrating that disruptive behaviour was lower when students sat in rows compared with such behaviour when they were seated in table groups, during independent academic work.

Wheldall, *et al.* (1981) subsequently replicated and extended the findings of Axelrod, *et al.* (1979) in two ABA studies in British primary school classrooms. The participants comprised two classes of 10- to 11-year-old children of academically mixed ability. A time sampling technique at five-second intervals was used to collect data on student on-task behaviour. Students initially sat in their usual table groups formation and were observed daily for two weeks, followed by two weeks seated in rows, and finally, two weeks back around tables. In the first study involving 28 children, the mean on-task behaviour was 72 per cent in the table groups 1 phase, increasing to 88 per cent under the rows condition and decreasing again to 69 per cent after reversal to the table groups 2 condition. In the second study, involving 25 participants, Wheldall, *et al.* (1981) found that the mean on-task behaviour of students was 67 per cent in the table groups 1 phase, increasing to 84 per cent under the rows condition, and decreasing to 72 per cent when seating was reversed to the table groups 2 condition. The results of both studies showed that the average amount of time students spent on-task in their mainstream classes, while carrying out independent tasks, was greater when students sat in rows.

The data were re-analysed, and the students grouped according to sex and

according to high, average or low initial on-task behaviour. The change in seating conditions affected boys and girls equally in both classes (Wheldall, *et al.* 1981), but differences were noted among participants when the participants' level of on-task behaviour during baseline table groups was considered. A negligible effect was found for students with high initial on-task behaviour, a moderate effect for students with average on-task behaviour and a substantial effect for students who had low on-task behaviour during baseline (Wheldall, *et al.* 1981). Wheldall, *et al.* (1981) concluded that manipulating seating in this way with children whose on-task behaviour is already high does not yield an appreciable effect. Students whose on-task behaviour is average when seated around tables may benefit from seating in rows, but students whose on-task behaviour is initially very low will benefit most, and appreciably, from sitting in rows in terms of increased on-task behaviour.

Both of these studies were partially compromised by ascending baselines in both studies, but the return to table groups in the third phase clearly showed lower on-task behaviour after reversal. These results support the findings of Axelrod, *et al.* (1979) that on-task behaviour is higher when students sit in rows compared with table groups, for independent tasks.

In another British study, Bennett and Blundell (1983) followed up the work of Wheldall, *et al.* (1981), by examining both the quantity and quality of work produced. They observed the effects of table groups and row seating arrangements in reading, language and mathematics classes. The participants were two classes (80 students) of 10- to 11-year-old children. Their results indicated that the quantity of work completed generally increased significantly when the children were seated in rows, but the quality of work was merely maintained or slightly improved.

Wheldall and Lam (1987) subsequently studied the effects of classroom seating arrangements (rows versus table groups) with three classes of 12- to 15-year-old students in a British school which catered for children with learning difficulties and behaviour problems. An ABAB design compared classroom behaviour in table groups and rows during mathematics classes at fortnightly intervals. A modified version of the OPTIC schedule (Merrett and Wheldall 1986) was used to measure student on-task behaviour and incidents of disruptive behaviour, as well as teacher positive and negative comments.

In all three mathematics classes, average on-task behaviour for the group more than doubled from 34 per cent in table groups 1 to 72 per cent during rows 1. In the return-to-baseline condition (table groups 2), average group on-task behaviour decreased to 35 per cent, and then nearly doubled again to an average of 69 per cent during the second intervention (rows 2). Eighty-eight per cent of the children were found to exhibit greater individual on-task behaviour when sitting in rows (Wheldall and Lam 1987). Also, disruptive behaviours reduced from an average of 31 disruptions during table groups 1 to 8 in rows 1. Disruptions increased to 24 during table groups 2 and fell again to 8 during the second intervention (rows 2) (Wheldall and Lam 1987). Consequently,

classroom teachers significantly increased their positive comments and substantially decreased their negative comments about both student academic behaviour and conduct (Wheldall and Lam 1987). Wheldall and Lam (1987) concluded that students with learning and behaviour difficulties spend more time on-task and are better behaved when seated in rows during individual academic work (Wheldall and Lam 1987).

Yeomans (1989), using an ABA reversal design, observed a mainstream, second-year junior class consisting of 21 students, aged 7 to 8 years. The aim of her research was to increase the on-task behaviour of the class by manipulating seating conditions. The position of the desks was moved from their usual 'tables' to 'rows' but the children and their partners remained constant. The OPTIC Schedule was used for observations. The results showed that the mean on-task behaviour of the class was about 49 per cent during baseline. In the intervention phase, the desks were then arranged in single-desk formation, each table seating two students. The mean on-task behaviour increased to 79 per cent and dropped to 38 per cent on reversal to the original 'table' formation. The data collected clearly showed a 30 per cent increase in the average time on-task for single desks over group tables. Teacher behaviour was also observed and showed that positive responses to academic behaviour increased while negative responses decreased. Positive responses to social behaviour remained virtually unchanged while negative responses decreased substantially during intervention.

Hastings and Schwieso (1995) subsequently conducted two similar studies. Their first study evaluated the effects of seating arrangements on the on-task behaviour of two parallel classes of 9- to 11 11-year year-old children in a British school. They attempted to examine whether any improvements made following a change in seating arrangements could be explained by novelty. The students were observed daily carrying out individual tasks. In both classes, an ABA design was used to record data over three, two-week phases. Class A was initially seated in a rows formation, then moved to table groups and then moved back to rows. In contrast, the students in Class B were initially seated in groups, moved to rows and then back to groups. The findings in both classes showed that the class average time on-task was greater in the rows condition. In Class A, the mean on-task behaviour during baseline (rows 1) was 75% per cent. This fell to 56% per cent when seating was changed to table groups and rose to 79% per cent when classroom seating resumed to a rows configuration. In class B, mean on-task behaviour was 66% per cent during baseline table groups. It rose to 76% per cent when seating arrangements were changed to rows and then decreased to 65% per cent when classroom seating reverted back to table groups. Consequently, Hastings and Schwieso (1995: 289) concluded that the improvements in the participants' on-task behaviour during rows arrangements could not be explained by novelty.

In the second study, Hastings and Schwieso (1995) examined the on-task behaviour and out-of-seat behaviour of three individual children (Kevin, Luke, and Mark) as well as the on-task behaviour of the whole class (eleven boys and nine

girls, aged 8 to 9 years) using an AB design (table groups/rows). Observations took place for three weeks in each of the baseline and intervention phases. At baseline, the mean time on-task for the class as a whole was 48 per cent, while for Kevin, Luke and Mark on-task behaviour averaged 16 per cent, 26 per cent, and 6 per cent respectively. After intervention (rows) the average time-on-task rose to 78.5 per cent for the whole class, and 90 per cent, 94 per cent, and 89 per cent for Kevin, Luke and Mark respectively. The class as a whole was thus 30 per cent more on-task while Kevin, Luke and Mark were 74 per cent, 68 per cent and 83 per cent, respectively, more on-task when seated in rows compared with being seated in table groups. Out-of-seat behaviour during baseline was 86 per cent, 69 per cent and 91 per cent for Kevin, Luke and Mark, respectively, but fell to 11 per cent, 4 per cent, and 6 per cent, respectively, during intervention. These findings demonstrated that the change in seating arrangement from table groups to rows improved the on-task behaviour of the whole class, but was most effective for the three individual children who had the lowest on-task behaviour when seated in table groups (Hastings and Schwieso 1995: 289). These results replicated the findings of Wheldall, *et al.* (1981) who also found that children with the lowest initial on-task behaviour when seated in table groups made the greatest gains in on-task behaviour when seated in rows during individual academic work.

Group collaborative work

In the United States, Rosenfield, *et al.* (1985) evaluated the effects of classroom seating arrangements on three primary classrooms of regular fifth- to six-grade students. The participants comprised two high-ability, two low-ability, two high-interacting, and two low-interacting students. The researchers' aim was to test hypotheses about the relative effectiveness of different desk arrangements (rows, table groups and circles) for promoting student interactions identified as conducive to learning. All observation sessions took place while the participants were brainstorming ideas for written work. Participant on-task and off-task behaviours were observed. On-task behaviour was operationally defined to include 'actions directed toward solving the academic problem and verbal or physical actions contributing constructively to class academic activity' (Rosenfield, *et al.* 1985: 107). Specifically, on-task behaviour included hand raising, discussion comment, questioning/pupil request, listening, out-of-order comment, and speaking. Off-task behaviour was operationally defined to include 'actions not directed toward solving the academic problem and verbal or physical action not joining constructively in class academic activity.' Specifically, off-task behaviour included disruptive conduct, withdrawal/ disassociation, and aggression (insulting/teasing, yelling, fighting) (ibid.: 107–8).

Rosenfield, *et al.* (1985) found that circles produced a greater number of on-task oral responses and other on-task behaviours than did rows. The table groups arrangement also elicited more on-task behaviours and more hand-raising than

did rows, while the rows arrangement produced a higher number of withdrawal responses than did the table groups or circle arrangements and more off-task responses than did the circle arrangement.

Marx, *et al.* (2000) subsequently studied the impact of classroom seating arrangements (rows versus semi-circle) on the question-asking rate of 27 (15 female, 12 male) German fourth-grade students. In an ABAB within-subject design, the participants sat in their usual seating arrangement of rows for four weeks prior to data being collected. Commencing with a semi-circle arrangement, data was collected over eight weeks during mathematics and German classes. The participants alternated between two weeks in a semi-circle arrangement and two weeks in rows, and were randomly assigned to different seats during each phase of the study. The average rate of question asking per hour for the class as a whole over the eight-week observation period was three questions. The researchers' analysis revealed that a semi-circle seating arrangement resulted in a higher rate of question asking when compared with a rows configuration. Marx, *et al.* (2000) reasoned that the closer distance of seats between the teacher and students, and the orientation of the students' seats in respect of the teacher and other students led to increased question asking. These findings are similar to those of Rosenfield, *et al.* (1985) described above and further emphasise the importance of matching the type of activity (independent or collaborate work) and outcome desired with classroom seating arrangement.

Given the relative paucity of published studies, a number of (as yet) unpublished studies on classroom arrangements conducted in the United Kingdom, Australia and the United States may also be briefly considered, to the extent that they corroborate or extend the findings from the published studies reported so far. Given that these studies have not yet been subject to peer review, however, caution should be exercised in the degree to which they may be accepted as providing confirmatory (or contrary) findings. The experiments carried out in the United Kingdom and Australia, and reported below, were all conducted under the supervision of the first author of this chapter.

Unpublished British studies

Rendall (1983) examined whether the quantity and quality of academic work produced would increase concomitantly with increases in on-task behaviour when children's seating was changed from table groups to rows (Rendall 1983: 22). The participants were 108 top junior boys and girls aged 10 to 11 years in four classes. Rendall used an ABA design, with each phase being of two weeks' duration. On-task behaviour was observed in only one of the classes while academic product was measured in all four classes. Off-task behaviour during seating in rows was observed to be more passive, taking the form of daydreaming, looking out of the window, or looking around the room, while off-task behaviour when students were seated around tables involved communication with other children. On-task behaviour was again found to be higher under the

rows condition, but there were no significant changes in the quantity or quality of work produced.

Croft (1986) assessed the effects of seating arrangements (table groups versus rows) on 27 (11 girls and 16 boys) mixed-ability 6- to 7-year-old children during the morning English session, and the afternoon mathematics session. The study examined the effect of seating arrangements on the participants' level of on-task behaviour and on the quality and quantity of work produced. The impact of the different seating arrangements on the teacher's behaviour (use of praise and reprimand) was also examined. A modified version of the OPTIC (Observing Pupils and Teachers in Classrooms) schedule (Merrett and Wheldall 1986) was employed which records both student on-task behaviour and teacher feedback responses.

The mean on-task percentage for the whole English class was approximately 74 per cent during baseline (table groups 1), which increased to 92 per cent during intervention (rows) (a mean increase of 18 per cent), and decreased to 73 per cent after reversal (table groups 2). During number work, the mean on-task behaviour increased from 74 per cent during baseline (table groups 1), to 91 per cent during intervention (rows) (an increase of 17 per cent), and fell to 73 per cent during the reversal phase (table groups 2). These results clearly showed that these infant-class children spent more time on-task when seated in rows for individual work. The teacher's use of praise for academic behaviour increased and reprimands for both academic and social behaviour decreased during the row formation (Croft 1986). These results concurred with the findings of Axelrod, *et al.* (1979), Wheldall, *et al.* (1981) and Wheldall and Lam (1987). The percentage of work completed increased when the children sat in rows and the quality of both language and number work also improved.

Fielder (1987) studied the impact of rows seating arrangements on both student on-task behaviour and teacher responses. A modified form of the OPTIC schedule was again employed to collect data. Each child in the study was assigned a code letter, which was printed on the modified OPTIC schedule. This provided for individual, group, whole-class, and gender data to be analysed (Fielder 1987). A multiple baseline across classes design was used with a gap in observations to allow for an assessment of maintenance. Data was collected in Class A as follows: table groups (one week); rows (two weeks); table groups (two weeks); table groups but with no observations (three weeks); table groups (one week), and rows (one week). In Class B, data were collected as follows: table group seating (two weeks); rows (three weeks); rows with no observations (three weeks); rows (one week), and table groups (one week) (Fielder 1987). On-task behaviour increased when the participants were seated in rows and decreased during the reversal to table groups. For Class A, participants increased their mean on-task behaviour from 58 per cent during table groups 1 to 78 per cent during rows 1 (20 per cent increase). On-task behaviour then fell to 61 per cent in table groups 2 (17 per cent decrease), fell further to 54 per cent during the table groups continuation, and then rose to 79 per cent in rows 2 (25 per cent increase). Similarly

in Class B, participants increased their mean on-task behaviour from 66 per cent during table groups 1 to 83 per cent in rows 1 (17 per cent increase), increased further to 86 per cent during the rows continuation. On-task behaviour then fell to 66 per cent during table groups 2 (20 per cent decrease).

The data were also analysed to evaluate the performance of students with respect to sex, and with respect to high, medium and low initial on-task behaviour. Both girls and boys benefited from the intervention. The participants with the lowest initial on-task behaviour made the most significant gains during intervention, followed by slightly less significant gains by participants with medium initial on-task behaviour, and only slight improvements for participants with high initial on-task behaviour. These results concurred with the findings of Wheldall, *et al.* (1981).

Unpublished Australian studies

Clifton (1992) examined the effects of classroom seating arrangements on the on-task behaviour of a class of five 13-year-old children with severe to moderate disabilities, in a language communication lesson. An ABAB reversal design was used to take data over four phases of equal length (horseshoe, rows, horseshoe, rows) over 20 days. In all phases, the children were encouraged to choose their own seats. The horseshoe table group formation was found to encourage more student social interactions and off-task behaviour, and this was associated with more negative teacher responses. In contrast, seating in rows increased student on-task behaviour and this was associated with increased teacher positive responses (1992). These results concurred with the findings of Axelrod, *et al.* (1979), Wheldall and Lam (1987), and Wheldall, *et al.* (1981).

Puckeridge (1992) investigated the effect of different seating arrangements (table groups versus rows) on the independent journal writing of three 15-year-old female secondary school students with mild intellectual disabilities during independent journal writing. An ABAB reversal design was used (table groups 1, rows, table groups 2). Average on-task behaviour was 72 per cent in table groups 1, and increased to 95 per cent in rows 1, decreased to 82 per cent during table groups 2, (but remained higher than baseline), and increased again to 96 per cent following the change to rows 2. The average percentage increase for time on task for rows over groups was 24 per cent during phases one and two, and 14 per cent during phases three and four. Mean time-on-task for each participant was highest when the students were seated in rows.

In a second study, Puckeridge (1993) observed the on-task behaviour of a small class of seven male students in a Year 9 secondary school during remedial English lessons. An ABAB design (table groups 1, rows 1, table groups 2, rows 2) was employed. The average level of on-task behaviour increased from 73 per cent in phases one and three to 92 per cent during intervention in phases two and four. Looking at the average number of words written across phases, the results showed 74 words in phase one (table groups 1), 105 words in phase two (rows 1),

87 words in phase three (table groups 2), and 109 words in phase four (rows 2). The results of this study clearly showed that when students were allocated seating in the two front rows, with at least a desk space between students, both on-task behaviour and productivity increased compared with when students were able to choose their own seating.

The subjects in a study completed by Pooley (1993) all had a mild intellectual disability. Pooley evaluated the effects of classroom seating arrangements on the behaviour of two classes of primary students and of their teachers. Class A was observed during spelling and Class B during journal (diary) writing. An ABA reversal design was employed (table groups 1, rows, table groups 2) with data being taken for two weeks during each phase. The OPTIC schedule for collecting data on both teacher and student interaction was again employed.

In Class A (spelling), mean on-task behaviour was 41 per cent during baseline. This increased to a mean of 72 per cent during intervention and fell to a mean of 52 per cent during the return to baseline. Teacher positive comments increased from a mean of 6.5 during baseline to 13.3 during intervention and fell to 10.5 during the return to baseline. These findings were similar to those of Wheldall and Lam (1987).

In Class B (journal writing), mean on-task behaviour during baseline was 63 per cent. This increased to 80 per cent during intervention and fell to 71 per cent during the return to baseline. Contrary to what occurred in Class A, teacher positive comments were reduced during intervention from 3.7 during table groups 1, to 2 during intervention, and increased to 3.6 during table groups 2.

Baseline data showed that one-third of the participants had low on-task behaviour (less than 60 per cent) when seated around table groups while the remaining two-thirds had average on-task behaviour (60–80 per cent). Participants with low on-task behaviour increased their on-task behaviour by 20 per cent when seated in rows. However, the on-task behaviour for those with average levels during baseline did not increase significantly. When seating arrangements were reversed to table groups in the third observational phase, there was a significant decrease in the on-task behaviour of the students who had shown positive gains. The on-task behaviour of the other two-thirds of the class decreased only marginally. These results again concurred with those of Wheldall, *et al.* (1981 – see p. 179), namely that students with the lowest on-task behaviour in table group settings benefit the most from classroom seating arranged in rows during academic work.

Sharma (1992) examined the on-task behaviour of a class of 11- and 12-year-old (Year 7) secondary students during mathematics. A modified version of the OPTIC schedule was again used, where each student's on/off task behaviour was rated every five seconds, using an interval recording system. On-task behaviour increased during intervention (rows) with the most significant gains being made by those with the lowest on-task behaviour during table groups seating arrangements. On-task behaviour was found to be 65 per cent in table

groups 1, increasing to 79 per cent in rows and then decreasing to 71 per cent in table groups 2. These results concurred with those of Pooley (1993), Wheldall and Lam (1987), and Wheldall, *et al.* (1981) that on-task behaviour is higher when seating is in rows than when students are seated in table groups for academic work.

Unpublished American studies

Wengel (1992) conducted a non-experimental study of four primary school classrooms in Virginia, USA. She observed each classroom for 25–40 minutes to determine any impact of classroom seating arrangements on student learning. Her sample comprised a combined first- and second-grade class which used a horseshoe arrangement, a second-grade class which used both rows and table groups, a third-grade class which used table groups, and a fourth-grade class which used a random design. She found no overall optimal classroom seating arrangement, but rather suggested that seating arrangement should be adjusted according to instructional method, classroom logistics, student personality, and task in hand (Wengel 1992: 43). Wengel (1992) stated that when given a choice, the participants usually chose rows or individual seats to do independent work which concurred with the findings of (Wheldall, *et al.* 1981) where students also expressed a preference for rows seating.

In another study completed in the United States, Bonus and Riordan (1998) looked at the effects of different seating arrangements (table groups, U-shaped groups, and rows) on the on-task behaviour of 6- to 7-year-old children and on their teachers' behaviour. Their results were consistent with those of the Wheldall, *et al.* (1981) study that found that on-task behaviour was higher when students were seated in rows. However, the US study was flawed in several respects and will not be detailed further here.

Conclusion

A review of the (limited) published literature over four decades has demonstrated, with remarkable consistency, that the manipulation of classroom seating arrangements can exert a powerful influence on student (and also teacher) classroom behaviour. Moreover, these findings were confirmed when a series of as yet unpublished studies were also considered.

When students were required to complete independent 'seat' work, there was little doubt that rows-style seating arrangements led to higher levels of on-task behaviour, usually accompanied by greater academic productivity. Students with the lowest on-task behaviour during (what is now typical) table groups seating arrangements made the most significant improvements in on-task behaviour and rates of disruption during academic work. Moreover, teacher praise statements were more frequent when students were seated in rows compared with when they were seated in table groups. On-task behaviour was also found to be higher

when students were seated next to a student of the opposite sex. However, when students were required to verbally interact in whole-class discussions, on-task behaviour was higher, and disruptions were lower, when participants were seated in circles or semi-circles.

The clear implication to be drawn from these studies of classroom arrangements, particularly when attempting to meet the needs of students with learning and/or behavioural/attentional difficulties, is that teachers should consider the task in hand when determining the appropriate seating arrangement. There is no one seating arrangement that is appropriate for all classroom activities. If interaction among students is required for the successful completion of the classroom activity or if group discussion is required for other purposes then it makes little sense to seat students in rows; table groups seating is clearly and logically the preferred option.

It appears, however, that independent, individual seat work is more often required and that this is equally and clearly best accomplished when students are seated in non-social seating arrangements such as rows. Few adults would choose a social context in which to compose an important letter, for example, and it amounts to little short of (albeit unwitting) cruelty to require individual work to be completed in seating contexts specifically geared towards interaction and conversation. If we are seeking to meet the needs of students with learning and behavioural difficulties in the classroom, then teachers should carefully consider the most appropriate seating arrangement for the specific task in hand.

References

Axelrod, S., Hall, R. V. and Tams, A. (1979). Comparison of two common classroom seating arrangements. *Academic Therapy*, *15*: 29–36.

Bennett, N. and Blundell, D. (1983). Quantity and quality of work in rows and classroom groups. *Educational Psychology*, *3*: 93–105.

Bennett, S. N., Desforges, C. W., Cockburn, A. and Wilkinson, B. (1984). *The quality of pupil learning experiences.* London: Lawrence Erlbaum.

Bonus, M. and Riordan, L. (1998). Increasing student on-task behaviour through the use of specific seating arrangements. Unpublished Masters thesis. St Xavier University and IRI/Skylight Field-based Masters Program, Chicago.

Clifton, R. (1992). The effect of classroom seating arrangements on the on-task behaviour of children with severe to moderate disabilities. Unpublished report. Sydney: Macquarie University Special Education Centre.

Croft, A. M. (1986). Rows versus tables in the infant school: The effects of seating arrangements on quality and quantity of work produced. Unpublished dissertation. Birmingham, UK: University of Birmingham.

Dawe, H. C. (1934). The influence of size of kindergarten group upon performance. *Child Development*, *5*: 295–303.

Department of Education and Science. (1967). *Children and their primary schools.* Report of the Central Advisory Council for Education in England. London: HMSO. (Known as the 'Plowden Report'.).

Fielder, J. (1987). The influence of classroom seating arrangements upon children's behaviour levels and the rates of teacher approval and disapproval. Unpublished dissertation. Birmingham, UK: University of Birmingham.

Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999). *Inside the Primary Classroom: 20 years on*. London: Routledge.

Griffith, C. R. (1921). A comment upon the psychology of the audience. *Psychology Monographs, 30*: 36–47.

Hastings, N. (1995). Seats of learning? *Support for Learning, 10*(1): 8–11.

Hastings, N. and Schwieso, J. (1995). Tasks and tables: The effects of seating arrangements on task engagement in primary classrooms. *Educational Research, 37*(3): 279–91.

Kern, L. and Clemens, N. H. (2008). Antecedent strategies to promote appropriate classroom behavior. *Psychology in the Schools, 44*: 65–75.

Krantz, P. M. and Risley, T. R. (1977). Behavioral ecology in the classroom. In K. O'Leary and S. O'Leary (eds), *Classroom management: The successful use of behavior modification*, 2nd ed. New York: Pergamon, 349–67.

Marx, A., Fuhrer, U. and Hartig, T. (2000). Effects of classroom seating arrangements on children's question-asking. *Learning Environments Research, 2*: 249–63.

Merrett, F. and Wheldall, K. (1986). Observing pupils and teachers in classrooms (OPTIC): A behavioural observation schedule for use in schools. *Educational Psychology, 6*: 57–70.

Pooley, A. (1993). A study of the effects of two classroom seating arrangements on the behaviour of two primary classes of students with mild intellectual disability. Unpublished report. Sydney: Macquarie University Special Education Centre.

Puckeridge, J. (1992). Rows versus tables: The effects of two classroom seating arrangements on levels of on-task behaviour on three teenagers with special needs. Unpublished report. Sydney: Macquarie University Special Education Centre.

Puckeridge, J. (1993). Seating choice versus allocation: The effect upon student's on-task behaviour when seating in rows. Unpublished masters dissertation. Sydney: Macquarie University.

Rendall, S. E. (1983). The influence of classroom seating arrangements upon on-task behaviour and the accuracy and production of children's academic work. Unpublished dissertation. Birmingham, UK: University of Birmingham.

Rosenfield, P., Lambert, N. M. and Black, A. (1985). Desk arrangement effects on pupil classroom behaviour. *Journal of Educational Psychology, 77*: 101–8.

Schwebel, A. I. (1969). Physical and social distancing in teacher-pupil relationship. *Dissertation Abstract International, 31*: 973B–2378B. (University Microfilm No. 2370–16250.).

Sharma, V. K. (1992). Do students work better when sitting in rows or in tables settings in the classroom? Unpublished report. Sydney: Macquarie University Special Education Centre.

Shores, R. E. and Haubrich, P. A. (1969). Effects of cubicles in educating emotionally disturbed children. *Exceptional Children, 34*: 21–4.

Wannarka, R. and Ruhl, K. (2008). Seating arrangements that promote positive academic and behavioural outcomes: A review of empirical research. *Support for Learning, 23*: 89–93.

Wengel, M. (1992). *Seating arrangements: Changing with the times*. Eric Document Reproduction Service No. ED348 153.

Wheldall, K. and Lam, Y. (1987). Rows versus tables II. The effects of two classroom seating arrangements on classroom disruption rate, on-task behaviour and teacher behaviour in three special school classes. *Educational Psychology, 7*: 303–12.

Wheldall, K. and Olds, P. (1987). Of sex and seating: The effects of mixed and same-sex seating arrangements in junior school classrooms. *New Zealand Journal of Educational Studies*, *22*: 71–85.

Wheldall, K. and Glynn, T. (1989). *Effective classroom learning: A behavioural interactionist approach to teaching.* Oxford: Basil Blackwell.

Wheldall, K., Morris, M., Vaughan, P. and Ng, Y.Y. (1981). Rows versus tables: An example of the use of behavioural ecology in two classes of eleven-year-old children. *Educational Psychology*, *1*: 171–84.

Yeomans, J. (1989). Changing seating arrangements: The use of antecedent control to increase on-task behaviour. *Behavioural Approaches with Children*, *13*: 151–60.