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**RLC Research Review:**

**Effective grouping and setting and the development of growth mindsets among different groups of pupils\_9**

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| Title: |
| Watkins, C. (2010) Learning, Performance and Improvement, Research Matters, 34, pp.1-16. ISEIC: Institute of EducationKutnick, P., Sebba, J., Blatchford, P., Galton, M., Thorp, J., MacIntyre, H. and Berdondini, L. (2005). 'The effects of pupil grouping: Literature review'.Parsons, S. and Hallam, S. (2014). 'The impact of streaming on attainment at age seven: evidence from the Millennium Cohort Study'. *Oxford Review of Education,* 40 (5)*,* 567-589. |
| Method: |
| The Watkins’ literature review covers evidence collected from over 100 studies of classroom-based research in addition to knowledge from a wider field. The literature is grouped according to the key themes of learner orientation and achievement and learning about learning. The concepts of performance versus learning are key frames for understanding the arguments. The author is a leading writer in the field of school effectiveness, learning about learning and learning-centred schools and classrooms. The literature was selected according to the criteria of the author and covers a wide range of methods, including experimental and longitudinal studies. These were selected from around the world and span the period from 1980s to the present day. The intention is to show how a focus on learner orientation and meta-learning can lead to school and classroom environments that positively impact on student achievement.The Kutnik et al literature review provides a comprehensive coverage of research into the effects of both organisational grouping (esp. setting, streaming) and within class grouping in both primary and secondary school contexts in the UK. The sections on primary and transition into secondary were the focus for this review. The evidence covers a range of studies undertaken in the last 20 years, using experimental as well as naturalistic (observational) methodologies. Practical and implementation issues are also covered in this review.The study by Parsons and Hallam (2014) looks at evidence from thousands of students and examines the effects of streaming on attainment and other outcomes comparing the experiences of those in streams to those in mixed ability organisational groups. |
| Overview of the issue or subject: |
| Grouping and setting in Primary Schools:Organisational ability grouping (Setting and streaming) and attainment:Most research internationally on the effects of ability grouping has focused on effects at secondary level. The majority of these studies find no overall effect on attainment but some show strong widening of the gap between the low and high attainers. Many factors are likely to influence the outcome of setting or streaming, including curriculum differentiation, teacher attitudes, parental attitudes and child characteristics (such as starting level, SES, ethnicity and gender). Curriculum differentiation is a particularly salient factor in secondary schools since teaching a ‘more appropriate curriculum’ for lower ability students effectively puts a cap on achievement. The practice of setting by subject areas, especially English and Mathematics (to a lesser extent Science) is much more common than overall streaming of pupils by ability across a year group.In primary schools, recent figures from the Millennium Cohort Study (MCS) suggest that just under 17% of children in primary schools in England are streamed. This appears to show an upward trend in more recent years of this practice with one study suggesting in the early 1990s around 3% to be using streaming. One major new study followed the progress of over 14,000 UK pupils from nine months to seven years of age using data from the MCS and the National Pupil Database (NPD). 83% of these children were not streamed, 8% were in the top stream, 5% in the middle stream and 4% in the bottom stream. Average key stage 1 (KS1) assessment scores showed that, compared to the mixed ability groups, top achievers did better in reading, writing, maths and science. Middle and lower ability students did worse across than the mixed group in these four subjects. The study looked at other child characteristics, such as prior achievement, gender, age and health. Even when controlling for previous achievement, the top set students still outperformed the mixed ability group and the middle and lower groups did worse than the mixed ability group for reading and overall KS1 measures (but not being in the middle stream for maths). This study confirms the ‘divergence’ hypothesis, in that the gap is bigger between high and low achieving students in streamed schools than in the mixed ability groups. Streaming as an approach to organisational grouping, has not been shown overall to have an impact on pupil achievement in primary school, rather it tends to increase the gap between the top and bottom. The reasons for this are likely to be many, and include the attitudes of parents, teacher and pupils to their placement to an ability group. As movement between sets is often difficult, this can have a pernicious effect on students placed in the ‘wrong’ group. Given research findings that shows pupils from lower socio-economic status (SES) as being over represented in the lower sets, this suggests streaming will worsen the gap in achievement between high and low SES pupils. Within class grouping in primary schools:Introduction:Research in the area of within-class grouping is less straightforward to form overall conclusions from but appears to have a much greater potential for individualising instruction and encouraging effective teaching and learning environments. Primary school classroom organisation has changed over the last several decades in the UK. The Plowden Report in 1967 recommended a shift from teacher to pupil-centred approaches over time and one of its initial suggestions was that teachers should consider organising the seating of pupils into groups in order to keep the majority of the class busy while the teacher focused on supporting a few pupils. Initially, the practice of organising within class groups by ability was the most common practice based on the idea that teachers could provide appropriate level support and challenge. In the 1950s and 1960s, most classrooms had children sitting on individual desks in rows facing the teacher. Most primary schools today have children seated on tables of 4-6, although there is usually no relationship between seating arrangements and grouping for learning purposes (i.e. students may be seated in groups but working alone or listening to the teacher).Observations of primary school pupil groupings have shown:* While small group work has increased in the ‘modern’ classroom, individual work still dominates
* Children spend the vast majority of their time sitting and in the presence of (but not necessarily working with) their peers rather than with their teacher
* Primary school children engage mostly in *practice* and *revision* tasks (as opposed to discovery learning, applying existing skills to new problems or engaging in a task which introduce new ideas, procedures or skills)
* Groupings are often made on the basis of friendship
* KS2 pupils are aware of the reasons for grouping and generally accept them
* Pupils are most likely to be seated in an arrangement that is *counterproductive to their nature of their learning task*

Attainment and the effect of within-class grouping:Comparing similar to mixed ability within-class groups tends to show no significant overall difference in average attainment. However, rather like the findings for setting, some evidence suggests that lower attaining students do worse when placed in similar level groups. Other research shows motivation levels to be lower for low attaining pupils when grouped by similar ability and show that they are more likely to receive attention from the teaching assistant rather than their teachers. In contrast, lower achieving pupils appear to benefit from having higher achievers in their group. An interesting question (as the evidence is not clear) is whether the high achievers could also benefit. Meta-analyses of research on peer teaching show significant effect sizes for pupil achievement gains where this is used effectively. Furthermore, this research often shows that the gains in achievement are as big, if not bigger for the ‘teacher/expert’ in the relationship. Therefore, organised appropriately, there may be reason to believe that high achievers could also benefit from mixed ability within class groupings. The relationship between group size and learning task:Groupings can be roughly divided up as: Individual working; pairs (dyads); small groups (4-8) and whole class teaching. * Individual work is most effective for practice and revision tasks (using skills not used for a while). Research shows that pupils work most effectively, staying on task longer, when seated individually for such tasks. However, pupils are frequently seated in small groups when working on practice tasks.
* Dyads can be particularly useful for cognitive tasks, involving problem solving and discovery learning. This can be arranged with an expert/novice set up (see above about the benefits for both) or with equals. The former works on Zygotsky’s idea of the Zone of Proximal Development in which the expert guides the novice to a level just beyond their current level of understanding. In the case of equal ability pairs, these are more collaborative. Good communication and mutual trust is an essential element for this to work effectively. “Think-pair-share” gives examples of this approach and resources are widely available online. Triads have been shown to sometimes bring in a power differential where one person is excluded and thus less effective collaboration takes place, however they can be useful for brainstorming tasks.
* Small groups are particularly good for collaborative and cooperative tasks. Collaborative tasks involve the whole group working together to solve one problem while cooperative tasks involve members of the group working on different aspects that they then bring together (jigsaw learning). A smaller group helps increase participation by all members while a larger group increases the diversity of views and ideas. Larger groups need more structuring to avoid them splintering into mini groups or for some pupils to lose motivation.
* Whole class teaching often follows traditional transmission ideas of learning and therefore some researchers advise against using this approach while others encourage the use of thinking time and open ended questions to make this more effective.

Research tends to show that teachers do not effectively link the nature of the learning task to the group size. Therefore students are often arranged in non-optimal groupings for effective learning.Class size and group size relationships:Meta-analyses by John Hattie have shown a negligible link between class size and achievement. He suggests that this is likely to be due to the fact that teachers do not adjust their teaching approaches according to the number of pupils in the class. The predominant group size for primary schools in the UK is 4-6 children; followed by 7-10 and then 11+ (which tends to be the whole class). In terms of group interactions, one study mapped these out and showed that 49% of the pupils’ experience was in small groups, followed by whole class (21%), then large groups (11%) and dyads (10%). Larger groups sizes are often forced on teachers in reception to year 2, due to the availability of teaching assistants and teachers and the expectation that these younger students need adult supervision for group tasks. In smaller class sizes, research has found *less cooperative group work* than in larger classes. Although teachers may give more individual attention and students may be more focused in smaller classes, the increases in attainment are generally very small. Overall, it may be more important for teachers to consider the type and size of their class groupings than the overall class size when it comes to planning for effective learning. Social Pedagogy of group workResearch strongly supports the notion that effective group work is dependent on positive relationships between group members. Skills include trust, sensitivity, effective communication and supporting others. Pupils actively trained to work in groups in such a way are more capable learners and achieve at higher levels in the classroom. Only about a quarter of teachers provide any specific training in group work skills to their students. Teachers’ reasons for this include, a lack of their own educational experience of such approaches, feeling that this will take too much time, beliefs that children will not learn from each other, that bright children will fall behind and that the purpose of group work is not always clear. Teachers have been found to sometimes be over-intrusive and attempt to transmit knowledge to students in group work rather than aiding reflection. One study also found that teachers are more likely to be seen interacting with highly achieving girls in the class and teaching assistants with low achieving boys.Friendship, gender and transition:Taking into account friendships is common for primary school groupings. These can have certain advantages in that they may have already built up a degree of trust and mutual understanding. Some research has shown that friendship pairings work differently between boys and girls. For girls, close friends often see supporting each other in class work as an integral part of their friendship. Therefore girl-girl friendship pairings are often highly effective. For boys, close friendships rarely included school matters and led to poor dyad work. For boy–boy pairs, acquaintance pairings generally work better than close friendship pairings for cognitive problem-solving tasks. An analysis of friendship interaction shows subtle differences, with some valuing a partner who was much more able and other times preferring someone of matched ability. Having a more skilled partner was particularly desirable for mathematics. Analysis of friendship patterns has been shown to be particularly important when looking at transition into the first years of secondary school where dips in performance and motivation are often a feature of some pupils’ experiences. Research on grouping and the link to research on mindsetsIntroduction – Mindsets (implicit theories of intelligence)Carol Dweck’s research spans many years of work in developmental, cognitive and social psychology and suggests that students adopt a view of intelligence that it is either ‘fixed’, i.e. due to talent, or ‘genes’ or that we have unfulfilled potential that can come from effort spent learning and trying a number of learning strategies - a ‘growth mindset’. Although Dweck has popularised these terms, in the academic literature they are more often referred to as *entity (fixed) and incremental (growth) implicit theories of intelligence (or ability)*. It is important to note that these ‘theories’ are not official academic theories, rather the ways that students (or learners more widely) think about their own abilities, learning and achievement. In Psychology, these are called ‘attributional theories’, i.e. to what we attribute our ‘successes’ or ‘failures’. Dweck’s concept can also be viewed as a motivational theory, in that the incremental implicit theory implies the greater usefulness of trying to improve one’s skills and learning through effort. In other words, these are our own personal theories and these are not explicitly expressed (pupils don’t normally tell us what their theory of intelligence is). Whether actual, academic research tells us that intelligence is fixed or modifiable is not the main issue then. It is however interesting to note that recent research of teenagers’ brains suggests that intelligence, in this age group, can change much more than was previously thought (up or down). Researchers have found evidence between students’ implicit theories of ability and achievement. Some studies have shown that having an incremental implicit theory leads to increased achievement compared to having an entity (fixed) theory. Other research has failed to show a link. This is a complex area and the relationship between the two may depend on a number of factors to do with the nature of the task (e.g. how challenging or evaluative it is perceived to be), culture (e.g. some cultures may tend to value effort over ability more than others) and others to do with the person (e.g. socio-economic status). Other research suggests that the context of the task might be an important factor, i.e. when the person has just experienced failure having a growth mindset leads to better performance on a subsequent similar task than a person adopting a fixed mindset. A person’s implicit theory of ability may also change over time, in different contexts or depending on the task. It can also be manipulated by a third person (e.g. a teacher) through the way tasks are introduced or by having pupils participate in a programme to encourage an incremental theory of ability. The link between mindset research and grouping:Mindset and grouping by abilityMost researchers would caution against grouping by ability as the effects of labelling can be very strong and it can reinforce students’ own judgements about their belief in their ability. This is particularly a problem since children tend to stay in the same ability group throughout their time at school once set. Interventions to teach children to have an incremental learning orientation have been shown to be successful with a range of abilities, from elite university students to low achieving secondary school students. Not only has having a growth mindset been shown to increase motivation, enjoyment of learning, active seeking of more learning strategies and increased attainment; it is also seen as protective against the low aspirations of peers and against the experience of a setback (learned helplessness). Perhaps the most optimistic estimate is that having (or teaching) a growth mindset can mitigate against the negative effects of ability grouping on low (and sometimes middle) attaining pupils. For pupils placed in higher ability groups (or schools), research points to the fact that even students with fixed mindsets can achieve very well in assessments and examinations if well prepared. What can happened though is that, faced with a situation that such a pupil finds difficult or challenging, they use avoidance strategies to protect their self-esteem and can lack the tenacity of a student with a growth mindset. Dweck particular cautions about high achieving girls who sometimes crumble after failure. Achievement orientationProbably the most powerful link between the research on effective within-class grouping and research on implicit theories of ability is the way that belief in a growth mindset affects a person’s achievement orientation. Those with a fixed mindset tend to adopt a *performance orientation* and are motivated by how they will look in relation to others. Those that hold this orientation:• believe that ability leads to success• want to be seen as able• want to do better than others • seek competition and public evaluation• display helplessness when faced with a difficult taskBy contrast, those holding a *learning (or mastery) orientation* (growth mindset) focus on developing their skills in the task itself. As such they:• believe that effort leads to success• believe in their own ability to improve and learn• prefer challenging tasks• define success at difficult tasks using their own criteria;• talk themselves through something when confronted with a difficult taskWatkins sums these differences up as proving (PO) versus improving (LO). There is considerable synergy between teaching approaches that encourage collaborative and cooperative group work and pupils’ learning orientation. This is because pupils with a growth mindset are less likely to compete with their peers and keep their learning to themselves if they believe that learning is about the mastery of skills and knowledge rather than about fixed ability. Positive relationships are more likely if students have a growth mindset since the sharing of knowledge and ideas is less likely to be seen as a threat to their relative ability position among the group and more likely to be viewed as a learning opportunity.The learner oriented classroom:When a teacher sets up a learning (or mastery) oriented classroom it is likely that pupils will be provided with far greater opportunities to reflect on their learning process and set their own criteria for success in challenging tasks, for example through discovery learning and problem solving tasks. In a ‘traditional’ class, the student’s job is to volunteer responses to the teacher; to work alone; to keep work private from others and to repeat rules and sanctions and procedures – i.e. a performance oriented classroom. In a Learning Oriented Classroom:• Equal participation is encouraged• Peer and group work/talk is promoted• Class generates rules and there is some freedom in the way of working• Praise is informative and credible• Peers seek and give help to each other• Improvement is the focus not test performanceResearch on effective grouping frequently stresses the need to promote positive relationships characterised by trust and support. Pupils may even adopt more ‘virtuous’ beliefs if they have a growth mindset. One study of high school students showed that those with fixed mindsets were more likely to judge cheating situations as acceptable in competitive team sports compared to their counterparts who had growth mindsets! Research on mindsets, grouping and transition to secondary schoolIn addition to the need to attend to the relative benefits (and hindrances) of existing friendship groups, transition to secondary school is seen as a stressful time for students, as for most, this will see significant changes in the grouping arrangements compared to primary school. Typically, students sit in paired desks, facing the front and this can be seen as threatening to the student, whose knowledge and skills are seen as more directly accountable to the teacher. Research on the effects of matching grouping arrangements in the first year of transition to secondary school, greater collaboration between schools and reduced class sizes for certain subjects in the first year have yielded some useful results although they may have considerable resource implications. One promising way to counteract the dip in motivation and achievement that occurs in some students in transition to secondary school is to teach a growth mindset to students. Early failure here on entry to secondary school can lead to a downward trajectory. One study showed that students with an incremental mindset had better performance in Mathematics than those with an entity orientation. Those taught on an extra curricular programme about the modifiability of talent through effort and how the brain grows new connections when it learns were able to halt this downward trajectory in mathematics.  |

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| Options or questions in relation to some of these key issues and debates: |
| As a teacher, how do I best match the seating/grouping arrangement to the nature of the learning task in my lessons?How do I consider friendship and gender seating?How can I train my students (or improve the way I teach them) to work effectively in groups?How can the teaching of a growth mindset be incorporated into classes to encourage a learning orientation?If we continue to use setting or streaming, how can we make this best of this approach? Particularly, how can we mitigate the damaging effect on lower achieving students and ensure that the top students thrive? |
| Potential issues to consider re implementation |
| A number of programmes can be utilised to train students in the use of collaborative group work, including the Kagan method and think-pair-share. Those that encourage the development of social relationships in context are preferable, compared to those that look at the development of skills in isolation (tick-box of skills approach). The former help develop inclusion of all pupils in active learning and discussion while the latter can result in tick-box approaches to learning social skills, derived from behavioural psychology. The latter’s tendency to use rewards for achievement of social skills may be detrimental in the long term, as pupils fail to internalise the benefits to their learning of working collaboratively.A major research programme that examines such an approach is called Social Pedagogic Research into Group work (SPRinG). Schools wishing to enhance group work approaches may want to look further into the research and the methods suggested for training pupils. One aspect shown in the study is that schools often use ‘banded’ ability groups rather than highly diverse ability groupings. In other words, they avoid groups with very high ability and also very low ability, as the gap may lead to problems collaborating on tasks. Rather they set banded ability groups where there is variation but less so.Schools will need to decide how school time is used to train pupils in these approaches, such as circle time or PSE. Research suggests that proper training takes time and often starts in failure. However time is used, teachers play a vital role in ensuring that group-working skills are used correctly. This includes pre-briefing, de-briefing and regular evaluation of group processes in addition to the normal attention on task processes and outcomes. In pre-briefing, students should be encouraged to talk openly about concerns, expectation and anxieties. The teacher’s role is to reassure and reinforce the collaborative/relational aspects of the group work. The de-briefing should help students to develop their awareness of interactions in the group and to themes that the group have identified as important. A recent UK report based on attempts to change Year 7 pupil’s implicit theories of intelligence towards a growth mindset through teaching about neuroscience found no short term impact on mathematics achievement. However, the programme itself was successful in changing students’ views on the modifiability of intelligence through learning and this change was stable over time. It also found that belief in the importance of effort was increased when the message was delivered by a teacher compared to using a computer programme. The report suggests measuring the effect of such an intervention on achievement over a longer time and in different subjects.A project led by Portsmouth University is currently investigating different strategies to encourage children to adopt a growth mindset and is due to release a report on progress this Autumn. It would be useful to think about how to implement such a strategy and how to target it most time and cost effectively. (see: http://educationendowmentfoundation.org.uk/projects/portsmouth-university/)Change may need to occur with teachers before it can happen to pupils. Teachers may need to move from teacher-centred to learner-centred strategies before they can move to a learning-centred classroom. In other words, teachers first need to give opportunities for collaborative work, active learning and learner driven learning. Only then can students start to reflect on their own learning process, self-regulate and develop a deeper understanding of their own learning process. Attempts to dictate the way students should learn tend to return to a discourse of teacher-centred approaches that are unsuccessful. |