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Welcome to **ATTACK!** a two-page occasional publication. Most of **ATTACK!** will be concerned with the holistic curriculum which, if acted on, is a fundamental way to undermine the present undemocratic education system. Don't be discouraged if opportunities to teach holistically are limited, do your best, be a guardian, and act as a witness to this culturally significant and inspiring way of teaching and learning. **ATTACK!** is a partner to https://networkonnet.wordpress.com

Attack! 38 To pair or not to pair?

Introduction: Pairing children in the classroom is used by many teachers for a wide range of purposes such as technology investigations, mathematics problem solving and for jointly composing stories and other texts in language. A relatively common use of classroom pairings is for peer tutoring purposes wherein a more able child assists a less able child. Research indicates that there are benefits for both tutor and tutee in such pairings (Topping, 1994). While peer tutoring is based upon an established research base, there is much less foundation in the literature for pairs which comprise children of similar ability. This article concentrates on exploring the dynamics of such pairings of children.

Method of study: A year-long qualitative study focused on the processes of collaboration between children when they engaged in problem solving. Eight pairs of children, all of similar age ability, from seven to ten years, were given a range of mathematics problems. The children chose their own partners and investigated the problems during their mathematics time at school. The problems ranged in type from closed (with one right answer) to more than one answer and 'fuzzy' (problems that required estimation).

An example of a closed problem is, 'The doctor says to take five pills, one every half hour. How long will that take?' An example of a problem with more than one answer is, 'Jill saw some friends with bicycles and tricycles. She saw 18 wheels. How many bicycles and tricycles could there be?' An example of a fuzzy problem is, 'Estimate the number of vets in New Zealand'.

The children were given three problems to work on during each maths time and worked separately from the rest of their class. The children had not seen the problems before nor had they been given any teaching by the researcher on how to solve them. The problems, however, were similar to those suggested in *Mathematics in the New Zealand Curriculum* (1992) at their level. The children were also familiar with undertaking problem solving in their own class programmes

Persistence in problem solving: In summary, this study found that pairs can encourage persistence and momentum when the problem on which children work is not perceived as 'too easy' and when one child in a pair persists when his or her partner appears to have given up. A child's persistence in the face of difficulty was often a key factor in recapturing his or her partner's interest and enthusiasm. For example, in the following episode, Sam (S) and Zane (Z) discussed the fuzzy problem, How many times a day does the average New Zealander laugh? On two occasions Zane appeared to want to give up:

Z: Depends on their sense of humour. If you've got a difficult kiwi sense of humour it might be different.

S. I think 100 times right now!

Z. I think up HERE (meaning where they are sitting), 100 times. Oh, impossible, it's impossible to answer (looks unimpressed).

S. You think up new jokes everyday:

Z. I know an easy answer (looks at Sam).

S. You don't really know, because you keep making up new jokes every day and you keep forgetting, so the answer keeps changing all time, ay? ay?

Z: Maybe, once I've never gone a day without laughing

S: At least once.

Z; At least 50 times!

S: There is a right answer 'cause it keeps changing each day.

Z; (Reads out question again.) AVERAGE - I think it means in the average day.

S: This classroom could be the average New Zealand

Z: And you could be an average New Zealander!

(continues)

When Zane stated that the problem was impossible to answer, Sam just continued on with it and so Zane did as well. The challenge of the problem appeared to be rather overwhelming to Zane and his comments indicated discouragement. Later in an interview he stated that the problem 'put me off a bit'. Insecurity can cause children to avoid taking risks and opt instead for 'safe' easy ways out to avoid further anxiety. For example, Zane stated, 'I know an easy answer', but he did not elaborate further as Sam ignored him and continued talking about jokes. Zane's easy answer may have led to premature closure and lower order thinking if Zane regarded finishing the problem as the main imperative rather than investigating what the problem means and what solutions were possible. It is interesting to note that further on in this extract, Zane suggested a focus on what average means which was taken up by both boys and subsequently formed the basis of their joint strategy.

There were many instances like this throughout the study. The role of 'persister' was not always the same child in a pair. The willingness of a reluctant partner to rejoin the problem solving remained crucial in sustaining momentum in collaborative problem solving. In the majority of cases, the reluctant child did rejoin the problem solving, which indicates his or her willingness and the attraction of a persistent partner. Similar ability pairs seem to encourage this persistence which, in turn, sustains both the collaboration and the problem solving. Enjoyment was often a corollary of the process of persistence and momentum. There was evidence to suggest that the children enjoyed a number of challenging problems and that this was related to their persistence.

In addition, collaboration was not a constant phenomenon for any pair during any one problem. Individuals within the pairs moved back and forth from collaborative talk to private musing in an ongoing manner throughout the problem solving. Such movement from the social to the personal seemed to be a natural part of the children's interactions. Nonetheless, even when a child appeared not to listen to his or her partner there was often evidence that the child had been monitoring what his or her partner said or did. For example, a child would often incorporate what his or her partner had said into the problem solving even though the child had not acknowledged it in any way and appeared to be pursuing a separate line of inquiry.

There was frequent evidence of children borrowing and building on each other's ideas during the process of problem solving. Sometimes both children would devise a joint approach from the outset. At other times, the children might commence working independently and then begin to work together as their problem solving progressed. When the problem appeared to be easy they would not consult with each other at all, suggesting that they did not see any need to work together as the solution seemed straightforward. In such instances, the children did not check on each other's thinking or reasoning. The context of a problem and the 'type' of problem appeared to be less important than the challenge and curiosity the problem elicited. Problems which appeared to challenge children at an optimal level engaged children in a number of ways. The children could, for example, reframe the problem in their own way, taking the role of tutor or corrector, take the role of tutee, finish each other's sentences, borrow each other's language, eliminate possibilities, negotiate strategies, challenge and counter each other, and so forth. These roles, and others, were often exchanged in a pair which seems to be a feature of similar ability pairs. That is, when children in a pair are of similar ability there is potential for both to take the role of 'expert' and 'novice' at different stages during the collaboration. It is acknowledged, however, that factors such as personality, attitude and confidence may affect the roles and relationships in such a pairing.

Conclusion: There are a number of implications for classroom practice and curriculum arising from this study. Teachers could consider that it can be helpful for children to work in similar ability pairs when investigating problems that children find challenging. Having a partner may assist children with persevering, maintaining interest and enjoying problem exploration in mathematics and other curriculum areas. Doubt, reluctance and frustration may be overcome by the mere presence of a partner or the persistence of a partner. Such persistence in problem solving is a useful quality and its absence can result in cursory or superficial efforts.

Having a partner to collaborate with may help children to persist with problems and to consider that they can be solved. A social context such as a pair can make it harder for a child to give up and easier for a child to persist. Furthermore, enjoyment and enthusiasm can be shared as children meet the challenges together. A more confident child could be paired with a less confident one with the aim of helping the latter to persist. The confidence that the more anxious child could accrue through joint problem solving may assist with both attitude and motivation. This implication does not overlook the possibility that a partner can also be a discouragement if he or she does not wish to pursue a line of enquiry and makes no attempt to do so. The readiness of a reluctant child to listen to and respond to a partner's suggestion seems crucial in sustaining a collaborative problem solving process. *(Deborah Fraser, University of Waikato)*

References:

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