



Collaborative philosophical inquiry for schoolchildren: Cognitive gains at 2-year follow-up

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Background. Evidence of maintained gains from thinking skills interventions are rare in the literature even within sectors of education, let alone across sectors.

Aims. This study investigated the cognitive effects of collaborative philosophical inquiry at long-term 2-year follow-up, after the participants had transferred to secondary (high) school without experiencing further philosophical inquiry in the interim.

Sample. Sample attrition was greater in the control than in the experimental group, but 96 experimental and 52 control subjects were available.

Method. Intervened children who engaged in collaborative inquiry for 1 hour per week over 16 months and whose pre-post cognitive gains were reported in Topping and Trickey (2007) were followed up 2 years later, some time after they had transferred from primary to secondary school, again using the Cognitive Abilities Test.

Results. The significant pre-post cognitive ability gains in the experimental group in primary school were maintained towards the end of their second year of secondary school. Higher achieving pupils were somewhat advantaged in sustaining these gains. The control group showed an insignificant but persistent deterioration in scores from pre- to post-test to follow-up.

Conclusions. Given the pattern of sample attrition, the group difference seems likely to be underestimated. The study provides evidence of maintained cognitive gains from collaborative philosophical inquiry, transferred across contexts. Implications for future research, policy and practice are discussed.

The study reported here investigated the long-term effects of experience of collaborative inquiry based on the principles of Philosophy for Children in primary school – and in particular, whether gains in cognitive ability were maintained when the pupils (students) were in secondary school 2 years later, even without further experience of Philosophy for Children in the interim. A cohort of pupils from a previous controlled pre-post investigation (Topping & Trickey, 2007) was followed up.

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Controlled studies of thinking skills interventions are quite rare in the literature, but those with follow-up data evidencing sustained gains much rarer. Much of the literature reports outcomes in primary (elementary) schools. Very little reports outcomes in secondary (high) schools. However, some of the literature is relevant.

Long-term effects of thinking skills interventions

The impact of transfer from primary to secondary schools on pupil progress has caused concern. In a review, Hargreaves and Galton (2002) found that pupils frequently failed to show progress on standardized tests at the end of their first year at secondary school when compared with their performance in the final term at primary school. A further review by Tobbell (2003) concluded that a large number of students experienced a downturn in their performance in the first year post-transition and that for a sizable minority performance continued to be a long-term problem. Hargreaves and Galton proposed that one causal factor was that teachers in secondary schools 'talk *at* rather than *with* their pupils, so that the ratio of statements to questions asked by the teacher has stayed remarkably stable over the last two decades . . . despite the calls for the greater use of interactive teaching' (p. 25) (also see Galton & Pell, 2002).

Many thinking skills interventions involve enhancing interactive dialogue, but there are few rigorously reported examples of such interventions in secondary schools. Existing reports tend to be descriptive and evaluation in terms only of participant perceptions (e.g. Davids, 1985; Williams, 1993). Finding rigorous studies of longer-term follow-up of gains from thinking skills programmes is difficult in any sector of education. McGuinness (1999) and McGuinness and Sheehy (2003) raised a number of concerns about thinking skills interventions regarding transfer, scaling up and sustainability. A search of the Education Resources Information Centre (www.eric.ed.gov) found 7,548 references to thinking skills studies, 4,802 of which referred to school classrooms. However, only 17 of these referred to sustaining gains (e.g. Entwistle, 1995; Haynes & Murriss, 2001; Iwanicki & Gable, 1983; Lee, 1989), and these lacked data on follow-up outcomes or focused on achievement only in curriculum subjects or on preschool interventions. A search of the Social Sciences Citation Index (SSCI) followed the same pattern.

One of the exceptions was a study by Rand, Mintzker, Miller, Hoffman, and Friedlander (1981), who claimed that gains from Feuerstein's Instrumental Enrichment (IE) programme were not only maintained but actually increased 2 years following the completion of the programme, on both verbal and non-verbal cognitive tests. Feuerstein's work has attracted critical attention (Blagg, 1991; Savell, Twohig, & Rachford, 1986), but here the focus is on the Rand study. This followed up 218 'low-functioning culturally deprived' adolescents. The experimental group were compared with matched controls that experienced a regular school curriculum. Immediately following the completion of the programme (at post-test), the IE group performed significantly higher than the control group on Thurstone's (1962) Primary Mental Abilities Test. The follow-up 2 years later used the Dapar Test with verbal and non-verbal subtests. The study had some methodological weaknesses, particularly regarding the comparability of follow-up data on a different measure. The study also omitted a full reference for the Dapar Test, so that it is difficult to evaluate the reliability and validity of measure used. The study concluded 'not only is the initial performance of the IE group maintained, but there is a substantial improvement over time', which is questionable given the different measures used. This study noted 'deterioration' in the performance of the control group.

In another exceptional study, Adey and Shayer (1994) demonstrated sustainable effects from their intervention (Cognitive Acceleration in Science Education - CASE) 3 years after completion of the programme ($N = 130$ students in each of the experimental and control groups). They used a range of immediate and delayed post-test measures (including Piagetian Reasoning Tasks), but the 3-year follow-up relied on General Certificate of Secondary Education (GCSE) public examination results in Science, English and Mathematics. Experimental group gains in results in all three subjects suggested not only sustained gains in science but also apparent cognitive skill transfer effects to English and Mathematics. However, the schools were chosen in consultation with Local Education Authority science advisers, who in some cases directed the researchers 'to schools which they felt would do a good job', so it is not clear to what extent these findings might be representative. There was a suggestion of population attrition, but no information was provided as to precisely what rates of attrition were and whether there was any difference between these in the experimental and control groups. Adey and Shayer also reported that CASE gains were found in Korea using Piagetian Reasoning Tasks and Raven's Matrices as post-test measures. More recently, Shayer and Adey (2002) reported subsequent CASE data from over 2000 pupils, gathered when arguably the approach was no longer novel and the participating schools not selected on the basis of high cooperation. Similarly maintained and transferred gains as in the 1994 study were found.

Maintenance of gains from the Promoting Alternative Thinking Strategies (PATHS) programme at 1- and 2-year follow-up in randomized controlled trials have been reported, but PATHS is more focused on social-emotional learning than cognitive skills (Domitrovich & Greenberg, 2000). Thus, only the Rand study and the CASE follow-ups give any indication of longer-term gains, and these studies have some difficulties. In general, follow-up studies of thinking skills interventions appear to be very scarce in the literature. The present study aimed to fill this gap.

Intervention

The intervention in the present study (Philosophy for Children) was characterized by a verbal cognitive focus and high self-regulated peer interactivity developing from initial teacher scaffolding. Philosophy for Children (Lipman, 1981, 1991, 2003; Lipman & Sharp, 1978; Lipman, Sharp, & Oscanyon, 1980) espouses the principle of cognitive modifiability. Lipman conceptualized three modes of thinking (*critical*, *creative* and *caring*) and four main varieties of cognitive skill (*inquiry*, *reasoning*, *concept formation* and *translation*). All of these elements constitute Lipman's definition of collaborative philosophical inquiry and featured in the intervention here.

In a systematic review of controlled outcome studies of 'Philosophy for Children' in primary (elementary) and high schools (Trickey & Topping, 2004), 10 studies met the criteria for inclusion, measuring outcomes by norm-referenced tests of reading, reasoning, cognitive ability and other curriculum-related abilities, by measures of self-esteem and child behaviour and by child and teacher questionnaires. All studies showed some positive outcomes. The mean effect size (Cohen's δ) was 0.43 with low variance, indicating a consistent moderate positive effect for Philosophy for Children on a wide range of outcome measures.

The intervention in this study was based on Lipman *et al.*'s (1980) process, but used more contemporary practical programme materials - 'Thinking through Philosophy' (Cleghorn, 2002). This programme describes stages in each lesson as follows:

(1) focusing exercise – scripted and aimed to create an alert but relaxed state in which the children’s attention is more ‘in the present’; (2) linking with the previous week – to reinforce memory of what has taken place the previous session and provide an opportunity to bring forward any new related thinking; (3) stimulus – typically a story or poem is read aloud by the teacher, accompanied by any relevant visuals; (4) pair work – providing an opportunity to check the children’s initial understanding of the stimulus; (5) dialogue in groups of about six children – the teacher encouraging pupils to: (a) communicate their views in response to an agreed subject of ‘inquiry’; (b) support their views with reasons; (c) listen respectfully to views being expressed; (d) indicate whether they agree or disagree with those views; (e) provide alternative viewpoints and (f) gradually develop a process of dialogue that helps the group construct a deeper understanding (or better solution) than would be possible individually; (6) closure – encouraging children to reflect on the discussion and how their thinking might have progressed and (7) thought for the week – highlighting a practical idea drawn from the stimulus to provide ‘homework’ for the rest of the week to help relate the main ideas to real situations outside that stimulus. A key element is the emphasis on developing a community approach to ‘inquiry’ in the classroom, characterized by open-ended Socratic questioning by the teacher, challenging the children to think more independently. Such questions are also instrumental in promoting teacher–pupil and pupil–pupil reciprocal dialogue.

For this intervention, in-service professional development support was coordinated by the head teacher of a local primary school (Paul Cleghorn), together with two senior teachers experienced in leading classroom inquiry. The combined time allocation of these three teachers to the initiative amounted to the equivalent of 0.2 of a full-time teacher. Pre-intervention for each participating teacher, development included a full day input together with observation of expert classroom practitioners and debriefing with that practitioner; and subsequently 10–12 hours of professional development during the first year of the initiative. Subsequently, each trimester participant teachers attended a 2-hour after-school group professional development session to share progress and talk through issues arising. Further support was available from the specialist teachers on a ‘call-out’ basis (Topping & Trickey, 2007).

Aims

This study aimed to answer two research questions:

- (1) Are pre-post gains from a collaborative philosophical inquiry intervention in upper primary maintained at 2-year follow-up in the absence of further such intervention?
- (2) Are any such follow-up gains sustained relative to the performance of a control group, or do controls ‘catch up’ so that experimental gains are ‘washed out’?

Method

Sampling

The study was located in a small ethnically homogeneous local education authority (school district) of mixed socio-economic status but including pockets of severe disadvantage. The authority refused to accept totally random sampling for this study. The eight initial intervention schools were to some degree self-selected from

19 possible (Topping & Trickey, 2007), but not on the basis of highest motivation or best organization. Four out of the eight intervention schools and four classes from their eight intervention classes were randomly selected by drawing lots at both levels (the pupils aged 10 at cognitive abilities pre-test). From the 11 non-intervention schools, four comparison or 'control' schools were selected as comparable in terms of best fit in pupil ability, size of school and social disadvantage. From these, a pool of matched classes was formed in terms of best fit to intervention classes in relation to pupil age and ability (but not gender). From this pool, three classes were randomly drawn for cognitive abilities testing (in the event from two control schools). Control children received classroom experiences and the class teachers continuing professional development experience 'normal' for the local authority (school district) at the same time as the intervention. This matched and random selection yielded groups for whom complete post-test data were available (experimental = 105, control = 72). Experimental and control groups were similar in pre-test scores and socio-economic status. The intervention group showed a preponderance of males (male $N = 60$, female = 45) when compared with the control group (male $N = 27$, female = 45).

For the follow-up study, experimental ($N = 96$) and control group ($N = 52$) participants were tested blind to condition. Sample attrition from post-test to follow-up was 9% for the intervention group and 28% for the control group (reflecting pupils moving out of the area and absent for follow-up test). Reasons for this difference were unclear. Intervention and control pupils were now mixed in the same class in the same school, and thereby subject to the same school influences. The original male gender bias in the 105 experimental subjects was similar but less at follow-up (54:42 male:female). However, there was a small male bias in the gender ratio of the control group (28:24 male:female), in contrast to a previously female gender bias, i.e. differential attrition by gender was evident. In the pre-post study, boys made higher gains than girls overall, so this differential gender attrition seemed likely to result in artificially high control group follow-up gains.

For completeness, analysis was undertaken of students for whom test results were available on all three occasions of testing. This yielded 71 experimental pupils and 44 controls.

Instrumentation

The updated version (CAT3) (Smith, Fernandes, & Strand, 2001) of the multiple-choice Cognitive Abilities Test (CAT) (Lohman, Thorndike, & Hagen, 2001) was used throughout (pre- to post-test to follow-up), not least as scores relate strongly to subsequent pupil attainment in external examinations at 16 years of age. Instructions are clearly scripted and the test is designed to be administered to the whole class by class teachers. Pupil response sheets were dispatched to the test suppliers for machine scoring. Items were scored correct or not, the maximum total raw score was 204 and the highest possible standard score 140, the test has a mean of 100 and standard deviation 15 in relation to the norms, and is relevant to pupils aged $7\frac{1}{2}$ – 17+ years. CAT3 was standardized on 15,859 pupils. In addition to an overall total standardized score, it provides scores for a total of nine subtests for each pupil, with reliability coefficients between 0.89 and 0.96. The validity of the test was established through a factor analysis of the nine subtests and by correlation between CAT3 scores and other evidence of intellectual ability.

The nine CAT subtests encompass:

- (1) Verbal Classification Test requires the selection of a word from five choices that conceptually relates to three other words.
- (2) Sentence Completion Test requires selecting a word from five to complete a sentence that has a word missing.
- (3) Verbal Analogies Test provides two words that relate – a third word that similarly relates must be selected from five choices.
- (4) Number Analogies Test provides two sets of numbers that are related in some way and another number on its own. A number must be selected from a choice of five that relates to the number on its own.
- (5) Number Series Test provides a series of numbers that are linked by a rule that needs to be deduced. The correct number must then be selected from a choice of five to continue the series.
- (6) Equation Building Test provides three numbers and signs that can be combined to make answers. The correct combination must be selected from a choice of five.
- (7) Figure Classification Test provides three figures that are related in some way. The relationship has to be deduced and a related selection made from five options.
- (8) Figure Analogies Test provides two figures that are related in some way (e.g. two squares). A third figure is provided and the correct choice from five options must be made showing the analogous relationship.
- (9) Figure Analysis Test shows a square of folded dark paper with holes punched into it. A choice showing how the paper would look when unfolded must be selected from five options.

(The authors will send further details of CAT to enquirers on request).

Procedure

Pre-post-testing spanned a 16-month period, during which the intervention operated for 1 hour per week. This period was from half-way through the penultimate year of primary education (January) to almost the end of primary education (June). Follow-up CAT testing was done 2 calendar years after post-test, after almost 2 years of secondary education (May). A member of the senior management team for each school administered the tests to whole classes, blind to condition (i.e. experimental and control group pupils were mixed in the same class and the tester did not know which were which). Pupil response sheets were dispatched to the test suppliers for machine scoring. The returned scores were analysed using analysis of variance and related *t* tests.

Results

Pre-post-test results were reported in Topping and Trickey (2007) – intervention children showed significant CAT gains, while controls did not (Table 1). For the intervention pupils, there was a mean positive change of 6.0 standardized points. One-way within-subject repeated measures ANOVA on the total CAT standardized scores of the intervention group indicated a highly significant gain ($F(1, 104) = 69.274, p < .001, \eta^2 = .449$). Pre-post data for the control pupils indicated no significant changes in any area and post-test scores tended to be lower than pre-test.

Table 1. Mean cognitive ability test scores for all subjects in experimental and control groups at pre-test, post-test and follow-up

	Pre-test (SD)	N and ES	Post-test (SD)	N and ES	Follow-up test (SD)
Experimental	99.0 (13.1)	N = 105 (ES = 0.46)	105.0 (14.1)	N = 96 (ES = 0.01)	105.2 (16.3)
Control	101.3 (12.0)	N = 72 (ES = -0.16)	99.4 (13.2)	N = 52 (ES = -0.08)	98.3 (12.9)

At follow-up, the mean score for the experimental pupils was very similar to that at post-test (no significant difference). This was despite anecdotal evidence from secondary school teachers and pupils, suggesting that pupils were demonstrating or enabled to demonstrate thinking skills in regular secondary school classroom lessons. The control group showed a further deterioration of one standard point from post-test (see Table 1 and Figure 1). The negative post-follow-up difference for controls did not reach statistical significance, but the pre-follow-up difference did. This whole picture remained unchanged when only subjects available for all three measures were used (Table 2).

Pre-post, the highest ability quartile had by far the smallest gain. The two middle quartiles showed the highest gains, with the lowest quartile not far behind (despite being depressed by one intervention school with the lowest gains) (Topping & Trickey, 2007). A mixed 2×4 ANOVA suggested that some quartile groups benefited from the intervention more than others. From post to follow-up, the lowest quartile lost a little of their original gain and the highest quartile gained more (see Table 3). However, the lowest quartile still achieved scores similar to the average of the control group. There was evidence that changes were scaled in accordance with the ability of the pupils, higher being better.

Discussion

This study provides evidence that gains in cognitive ability which opened up over the intervention period in primary school can be maintained over the subsequent 2 years into secondary school on the same measure, even when pupils have not had any

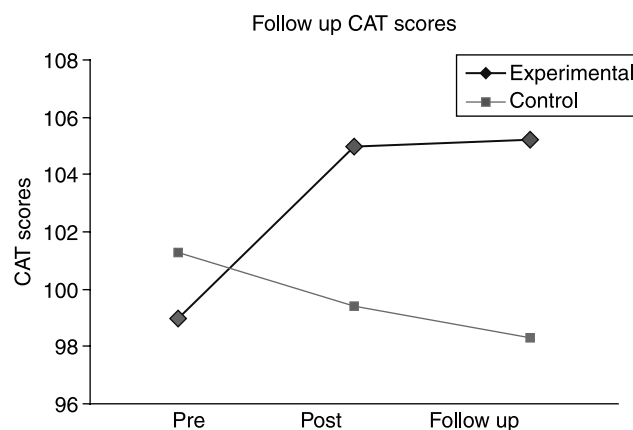
**Figure 1.** Mean cognitive ability test scores for all subjects in experimental and control groups at pre-test, post-test and follow-up.

Table 2. Mean cognitive ability test scores for experimental and control groups at pre-test, post-test and follow-up for subjects who participated in all three testings

	Pre-test (SD)	N and ES	Post-test (SD)	N and ES	Follow-up test (SD)
Experimental	99.9 (11.9)	N = 71 (ES = 0.48)	105.5 (12.7)	N = 71 (ES = 0.03)	105.2 (16.3)
Control	100.9 (11.6)	N = 44 (ES = -0.12)	99.5 (11.1)	N = 44 (ES = -0.09)	98.4 (12.1)

Table 3. Follow-up CAT scores of experimental pupils in ability quartile groups

Quartiles	N	Post-test score		Follow-up test score		Gain		
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	ES
First quartile	24	88.2	7.6	86.6	6.3	-1.6	2.0	-0.21
Second quartile	24	102.3	2.5	101.3	2.8	-1.0	0.8	-0.40
Third quartile	24	108.5	2.2	108.3	2.8	-0.2	0.6	-0.09
Fourth quartile	24	116.2	12.7	120.7	6.2	4.5	1.8	0.35
Total	96	105.0	14.1	105.2	16.3	0.1	1.5	0.01

further experience of collaborative inquiry in the secondary school. Higher ability pupils might be advantaged in sustaining these gains. There are practical implications here for curricular reform, linking with concerns about achievement 'plateaus' in the early secondary years, and specifically for further investigation of the continued plateau in thinking skills on transfer to secondary without intervention. Future research on thinking skills should include more longitudinal follow-up, and particularly of a cohort of primary schoolchildren who had regular experience of collaborative inquiry in primary school, adding comparison of a group receiving continuing collaborative inquiry at secondary school to a group with no continuing experience. The study has helped to address a substantial and troubling gap in the literature, which has strong implications for the cost effectiveness of thinking skills interventions.

Of course, many variables were uncontrolled in this study (such as variation between schools and classes and teachers). Nonetheless, it is difficult to see how a specific form of systematic bias could explain the results found. The attrition rates from pre-test to post-test were not significantly different between groups. The greater attrition from post-test to follow-up in the control group might to be associated with greater loss of more transient/less achieving pupils rather than more achieving pupils, so the further deterioration in control scores at follow-up might actually be an underestimate. The artificially high control group follow-up gains predicted on the basis of differential gender attrition did not materialize. For pre-post-testing, it could be argued (although there was no evidence of this) that the primary school control teachers might have been less motivated in administering the test and thus obtained depressed results. However, this could not explain the further deterioration at follow-up, where experimental and control pupils (now mixed in the same class) were tested together.

Conclusion

This study found that a weekly philosophical collaborative inquiry intervention in primary school led to pre-post gain in cognitive ability which was maintained 2 years later on the same measure, although the pupils had transferred to secondary school and experienced no further such intervention in the meantime. Higher achieving pupils were somewhat advantaged in sustaining these gains. The control group showed no gain on any occasion. Follow-up studies of thinking skills interventions are very rare in the literature, so this finding is an important contribution. However, automatic replication should not be assumed without careful attention to implementation integrity. There are implications for practice and policy, and also for future research on Philosophy for Children and other thinking skills interventions.

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