

The Effects of Drawing on Children's Second Language Writing Skills via the Channel of Inner Speech

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Abstract

Drawing on Vygotsky's Socio-cultural Theory, this study directly compared the writing outcomes of emergent second language (L2) writers who adopted a drawing-led approach to a guided writing approach. While past research has investigated how drawing served as a mediator to facilitate social speech for better writing performance, little is known about the sheer effect of drawing on second language writing without oral language effect from socialization, via the channel of inner speech. This study involved a total of 90 kindergarten children (mean age 6 years 1 month, SD 3 months) from 5 kindergartens in Hong Kong. Through an English writing enhancement program, this study compared the writing outcomes of emergent L2 writers under two seemingly incompatible approaches using mixed methods approach. The results revealed that the drawing-led group significantly outperformed the guided writing group in text length; and drawing-led group with high English language proficiency level significantly outperformed the guided writing group in text complexity. Qualitative analysis also suggested children in the drawing-led group demonstrated higher level of flexibility in syntactic, semantic, and pragmatic language use, contributing to more elaborated pieces of writing. When instructional writing approaches have recently gained more interest under the current educational climate, these findings extend our knowledge on how drawing functions as a mental tool to facilitate intra-psychological stage of learning for better writing performance.

Keywords: early literacy, second language writing, children drawing, inner speech

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Introduction

Despite research evidence and brain images which identified a strong and reciprocal relationship between drawing and emergent writing in the past decades (Elkins, 1999; Hubbard, 1989), there is a tendency for schools to skew towards an instructional approach, which prioritizes formal instruction and undervalues drawing when designing early literacy programs (Mackenzie, 2011; Olshansky, 2018; Yuan & Brown, 2015). Genishi & Dyson (2009) regarded this phenomenon as a response to the accountability movement in education. Under global education trend of pushing for formal literacy instruction and testing, symbolic and social play in early childhood classrooms is deemed expendable (Bergen, 2006), and drawing in particular, is marginalized as a decorative adjunct to writing (Adoniou, 2013). This study attempted to fill the research gap pertaining to the lack of direct comparison of two seemingly incompatible writing approaches and address the rarely discussed intra-psychological stage of learning derived from the drawing to write processes, via the channel of inner speech.

Vygotsky's theory of writing development suggests a temporal and maturation connection between drawing and writing. Shifting from drawing of things to drawing of words, Vygotsky suggested the essence of teaching written language is to organize a natural transition appropriately (Vygotsky, 1978, p.116). Vygotsky classified children's mental functioning in two orders: lower order as in natural and genetically inherited mental abilities; and higher order as in culturally or socially mediated mental activities that allow people to move from impulsive behavior to instrumental action. To bridge the gap between lower and higher mental functions, the intended use of mental tools, also known as external mediators, to mediate thoughts, feelings, behaviors, and even language is needed (Vygotsky, 1978, p.137). According to Bodrova and Leong (1996), effective external mediator should be meaningful to the child; be attached to the object of a task; remain salient when used; combine language and behavioral cues; within child's Zone of Proximal Development; be positive, promote instead of prohibit something from happening; and be first introduced and guided by adults, then used by the child independently. All in all, drawing is considered an apt external mediator to bridge children's mental functions for the development of writing competence (Tong, 2022). Figure 1 showed how drawing serves as a mental tool to bridge mental functions.

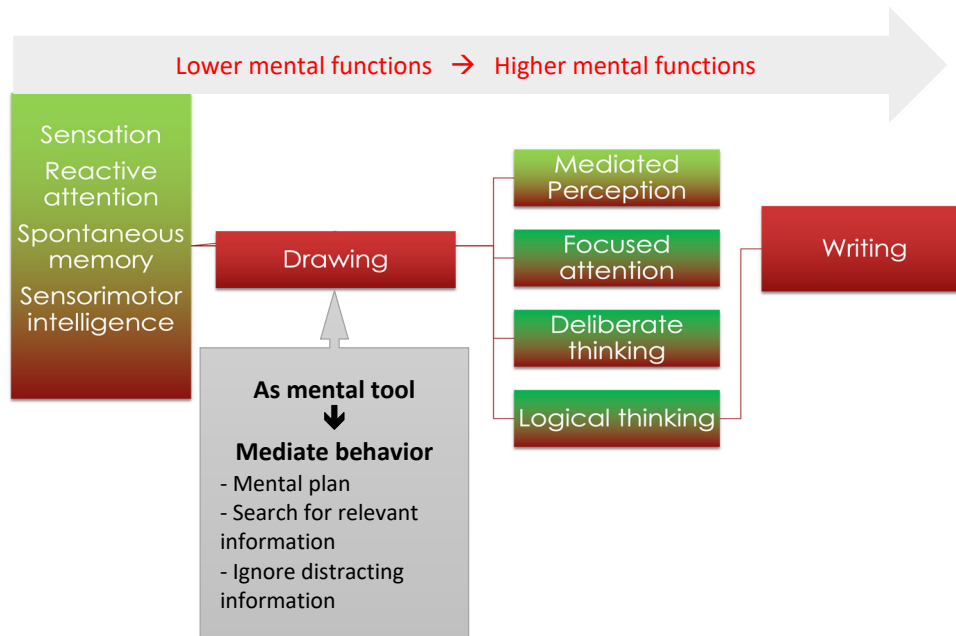


Figure 1. Drawing as a mediator to bridge children's low and high mental functions in writing (Tong, 2022)

The Socio-cultural Theory (SCT) developed by Vygotsky in 1978 has been regarded as a classic theoretical framework to explain many contemporary writing approaches (Fraser, 2015; Ghafar & Dehqan, 2013; Rogoff, 2003). The theory describes learning as a social process. As applied in second language acquisition, the learning process is achieved through children's imitation of the more knowledgeable others under certain socio-cultural setting, in which children make meaning through social speech and other socio-cultural experience (Ghafar & Dehqan, 2013).

Vygotsky's notion of social speech under the SCT has been extensively used in the past language research. Leading researchers investigating the effects of drawing on children's writing performance such as Mackenzie (2011, 2013) and Olshansky (1994, 2007, 2018) also posited their research on this ground, suggesting drawing as a channel to facilitate art discussions and verbal exchange of ideas. In fact, apart from this widely known overt nature of verbal exchange of ideas, the notion of socialization from Vygotsky's theories also covers a later stage of internalization which refers to individual's internal mental activities (intra-psychological). Despite the two-tier nature of socialization, it appears that second language

(L2) writing practice and research generally adopt the definition of socialization on inter-psychological level, such as shared writing, collaborative writing, and guided writing; very few is known about Vygotsky's theory on the later stage of intra-psychological learning, during which children develop individual mental functioning via the channel of inner speech.

According to Vygotsky, inner speech (IS) is defined as children's overt self-talk internalized to constitute covert verbal thought and this internalization of language is important because it drives cognitive development (Vygotsky, 1962, p.149). Vygotsky explicitly stated that children should be able to internalize language by the age of 6-7 (Vygotsky, 1978) and this saying has been widely supported by scientific research (Diaz & Berk, 1992; Flavell et al., 1966), suggesting children's overt private speech peaks at 3-4 years of age, decreases and be replaced by inner speech at 6-7 years of age, and mostly internalized by age of 10. Alderson-Day and Fernyhough (2015) further broke down the notion of inner speech into two stages, expanded IS and condensed IS. When children start using IS at age 6-7, they typically deploy specific and intentional use of expanded IS, which is more grammatical and syntactically structured; whereas adults tend to use more fluid and spontaneous form of IS, known as condensed IS, which is reduced to single forms and truncated utterances. Expanded IS occurs usually during linguistic tasks such as writing, or mental rehearsal of dialogue and are typically task-driven (Vissers et al., 2020). It helps children consciously focus on current or planned activity. The complexity of cognitive tasks contributes a large part to the IS involvement (Fatzer & Roebbers, 2012), it explains why children who possess less cognitive resources and control than adults would use expanded IS when handling cognitive demanding tasks (Vissers, 2020).

Since inner speech (IS) is a psychological process without external behavior, the simplest way to assess IS is to ask people to report it (Hurlburt & Heavey, 2015). For children who are not yet able to self-evaluate and report their inner mental state, training the participants to use IS when performing a non-verbal task is a valid alternative (Vissers et al., 2020). The advantage of this paradigm is that it controls for variability in the amount of reported IS experience compared to questionnaires. Other than using explicit IS training, cognitive dual-task method involving a linguistic task is another method to explore IS activity for young children (Geve et al., 2011; Langland-Hassan et al., 2015). This method involves focused activity with linguistic task that requires subvocalization (Feinberg et al., 1986). It

predominantly measures expanded IS that is typical for children at 6-7 years of age, under the hypothesis that sufficiently difficult tasks that involves the use of language for reading or writing will help children fall back on their inner speech to overcome difficulties (Liva et al, 1994). This study adopted the IS training and cognitive dual-task method to facilitate children's use of inner speech while performing their writing tasks.

Two Phases of the Study

The present study is a multisite quasi-experimental study conducted within 5 kindergartens in 2 phases. While the Pilot Program recruited final-year kindergarten children from low socio-economic status (SES) background, the Full Program involved children of the same age from low/medium/high SES background, determined by monthly family income and parent education level. The Pilot Program served to trial-run the writing program on children with limited L2 proficiency with reference to Olshansky's research in 2007, which pointed out that children from low socioeconomic background benefited significantly from the art-based writing program. Besides, before launching the Full Program, there was a need to test whether the writing program designed was viable to young children with minimal English language proficiency level. With initial consistent results with the literature and past research in text length (Makenzie, 2011, 2013 and Olshansky, 1994, 2007, 2018) but a lack of significant between-group difference in text complexity in children with low English proficiency level, a larger scale of study which involved participants from more diverse background was then conducted as the Full Program to explore whether children of different background and academic abilities would benefit equally from the draw-based writing program.

Material and methods

Data were collected on both children and classroom level including 1 questionnaire to parents, 5 pre-tests, 3 post-tests and 1 self-evaluation. While experimental group adopted a drawing approach, the comparison group used guided writing approach based on the primary

1 writing curriculum in Hong Kong, and both groups were introduced to the notion of inner speech and trained to use it during their writing processes. After the 7-day (Pilot)/ 10-day (Full) Program, Children's gains in text generation skills were measured by text length as in number of words produced (ww) and text complexity as indicated by the highest number of t-units produced (tu). The software program SPSS version 25 was used for statistical analysis. Qualitative data from children's creative writing task were also analyzed to illustrate quantitative findings. To ensure program fidelity, lesson observations, inter-rater reliability checking, measures to avoid diffuse of treatment information were in place. The design of the study was to address the research gaps pertaining to the rarely discussed intra-psychological stage of learning derived from drawing to write processes; and the lack of direct comparison of two seemingly incompatible writing approaches, with consideration to the curriculum gap between the oracy-based kindergarten and formalized primary L2 literacy curriculum in Hong Kong.

Participants

A total of 90 final year kindergarteners (mean age: 6 years 1 month, SD 3 months; 55 boys, 61%) from 5 kindergartens in Hong Kong, as well as their parents participated in this study. All the children were normally developing with non-English native family background. The children in each kindergarten were randomized into either drawing-led or guided writing group. Based on children's academic performance reported from class teachers, a stratified sampling was further in place to ensure both groups were comprised of participants with comparable academic abilities. Parents of the participants were invited to complete a questionnaire that inquired into home literacy resources, home literacy practice, and family socioeconomic status (SES). SES was defined based on the Population and Household Statistics analyzed by the District Council (Census and Statistic Department, 2020), with consideration on the Median Monthly Household Income (overall average = \$34,500); and Percentage of persons with Secondary Education and Above (overall average = 82.1%). With an exclusion of districts reaching the ceiling and floor of the two criteria, 3 districts situated

in Kowloon, the New Territories, and Hong Kong Island were identified to represent 3 SES groups of participants.

Measures

With reference to previous studies on early writing interventions with drawing, six major constructs were identified for the present study: SES of participants, L2 literacy input from family, non-verbal intelligence, L2 proficiency level, drawing skills and attitude, and post-program growth in writing. As for the notion of inner speech (IS), instead of viewing IS as an independent variable, explicit training for children was used as a valid alternative to better control the variability in the amount of reported inner speech experience (Vissers et al., 2020) with reference to the IS training model developed by Liva and colleagues in 1994. To validate if inner speech was present during the writing processes, a reflection form was in use to inquire about children's status of using IS.

The questionnaire

A 21-item questionnaire written in Chinese was designed to collect participant's general information and specific information in four domains: education level of parents and family language; English reading and writing habit at home; external resources contributing to the child's second language literacy proficiency; and the child's interest and attitude towards drawing.

General cognitive ability test

The Test of Nonverbal Intelligence (TONI)- 4th Edition (Pearson, 2010) was adopted to test participants' general cognitive ability. TONI-4 is a language -free test designed particularly for culturally and linguistically diverse groups who may have language-related limitations when expected to perform in mainstream English-speaking environments (McCallum, 2017). According to Easterly (2002), nonverbal cognition ability showed a high predictive power on children's literacy development at preschool age in response to drawing. Having been used for more than 30 years, the test has been regarded as reliable, valid, free from bias and psychometrically sound norm-referenced measure, normed on

demographically representative and stratified samples of 2272 people (Johnsen, 2017). TONI-4 is administered by eliciting responses from individual participants to give answers to the test through gestures. Age specific nonverbal tasks are mainly on recognizing relationships between visual concepts.

Spelling test

Children's phonological awareness is not only an important factor affecting children's text generation skills, but also relevant to children's production of inner speech (Adams et al., 2013). 10 regular and irregular words chosen from the National Literacy Strategy Key Words for Reception and Years 1 & 2 of UK were used as dictation items, these also represented high-frequency words (Department of Education and Skills- UK, 2011). Instead of giving dichotomous scores based on correct or incorrect spelling, a more sensitive scoring system Spelling Curriculum Based Measurement was used to enable a normally distributed rather than clustered score pattern. Curriculum Based Measurement is an empirically validated method with over 25 years of research on effectiveness (Fuchs & Fuchs, 2004). Scores are given based on correct letter sequences as well as words correctly spelled, for example the misspelled "summer" as "sumer (^s^u^m e^r^)" would still score 5 'correct letter sequence' points and 1 'word correctly spelled' point.

Text production test

A 5-minute Writing to a Picture Prompt Test (Hudson et al., 2005) was used to test children's ability to produce written text. The sentences produced were coded for the number of words written (ww), and the text complexity also known as the highest t-unit (tu). According to Hunt (1964), total number of words (ww) refers to the total number of words regardless of spelling correctness; and t-units (tu) is defined by a main clause plus all subordinate clauses and non-clausal structures attached to the sentence or embedded in it (Hunt, 1965). The combined (ww) and (tu) measures have been widely used in writing studies with young children with high reliability and validity (Puranik et al., 2018).

Drawing test

Compared with the informant-based questionnaire which is more prone to respondent-bias

and less feasible for establishing interventions, the performance-based test that measures children's fine motoric performance when administering structured task is more objective and widely used for motoric assessment (Strooband et al., 2022). Drawing to copy an image is one of the commonly used performance-based tests to evaluate children's fine motor maturity and visual perceptual skills. In this study, a simple line-drawn puppy was used. Children were asked to copy that image as close to the original image as possible where scores were given according to each detail and the use of space. In this Study, scores were given on 14 details of a puppy image, with an additional mark for appropriate use of space.

Impromptu creative writing test

The impromptu creative writing test was a post-test measure to evaluate children's post-program text generation skills with marking criteria (ww, tu) same as the Writing to a Picture Prompt Test. Children were given 15 minutes to incubate writing ideas and another 15 minutes to write their own story. Drawing group was asked to draw before writing; while the guided writing group was asked to write first, then draw to decorate their story. According to Gaies (1980) and Puranik (2018), the combined (ww) and (tu) measure is a reliable and valid measure to provide objective evaluation to written samples. Children's writing pieces were analyzed both quantitatively and qualitatively for evaluating their text generation skills after the writing enhancement program.

Reflection form

As a program wrap-up, children were given a 5-item reflection form to indicate whether they had used inner voice when creating stories, whether they would continue writing English stories after the program; their confidence in producing interesting stories in English. To simplify the reflection form, children were asked to circle either yes or no to indicate their response to each question.

Procedures

The major procedures in both the Pilot and Full Program consisted of pre-program measures; during-program activities; and post-program measures. Prior to the program, a

questionnaire and 5 sub-tests were administered to collect participants' variability information, and children were explicitly introduced to the concept of inner speech, framed as "talking to oneself in mind". They were made known to the methods to focus their attention on their own thinking during the ideation, creation and writing processes, given time to practice after teacher demonstration. During the program, children in both groups participated in a series of writing enhancement activities within 2 consecutive weeks in kindergarten classrooms, with experimental group received a drawing-to-write approach and comparison group received a guided writing approach adopted from the junior primary writing curriculum. Content-wise, the course materials and final product for both groups were identical, following a when/where/who/what/how framework. Instead of using a wide range of art materials to generate excitement and quality think time (Olshansky, 2018), the medium of creation for this study was controlled to be pencil and a blank booklet to avoid disperse of attention, based on Piaget's Centration Theory (Piaget, 1962, p.63). After the program, children were asked to complete the text-production test in the Pilot Program, and an additional impromptu creative story writing task, and a short reflection form for the Full Program.

Results

The Pilot Program

The pilot study involved 36 final year kindergartners (19 boys, 17 girls) from low SES background. Independent Samples T-test showed a high level of between-group homogeneity in participants' background including their non-verbal intelligence, drawing skills and motivation, writing skills, literacy input from family, and parents' education level with all *p-values* > .05.

Results of independent-samples T-Test on post-program gains in writing scores

Participants who failed to meet the attendance requirement and those who did not attend

the post-test session were excluded from the analysis. The number of participants for analysis was 22 out of 36 with equal gender distribution and approximate number of children in each group. An independent-samples T-test was conducted to compare the gains in mean scores between the drawing group (experimental) and the guided writing group (comparison) in two test areas: text length (ww), and text complexity (tu). Participants in both groups demonstrated gains in scores in (ww) and (tu) after the Pilot Program.

As shown in Table 1, regarding the results in score gains in text length (ww), there was a significant between-group difference in the scores gained in (ww) for guided writing group ($M=2.1$, $SD=6.82$) and drawing group ($M=10.92$, $SD=9.17$); $t(20) = 2.51$, $p=.02$. Hedge's g was adopted considering the small group size and different standard deviations of two groups. The effect size of program effect on (ww) was large at 1.08. As a convention, an effect size that is larger than 0.50 is regarded as large (Fuchs et al., 1999). The results suggested that children in the drawing group were associated with a significantly larger mean gains in the number of words produced after the writing program than those in the guided writing group. However, for text complexity, there was no significant difference in the length of the most complicated sentence gained (tu) for guided writing group ($M=4.20$, $SD=2.86$) and drawing group ($M=2.83$, $SD=2.72$), $t(20) = 1.15$, $p=.27$.

Table 1. *Pre- and post-program Mean Score Comparison by Group (Pilot Program)*

	Group	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i> (20)	<i>p</i>	Hedges' <i>g</i> (Effect Size)
Post-program gains in text length (ww)	Guided writing	10	2.10	6.82	-2.51	.02	1.08 (Large)
	Drawing-led	12	10.92	9.17			
Post-program gains in text complexity (tu)	Guided writing	10	4.20	2.86	1.15	.27	N.A.
	Drawing-led	12	2.83	2.72			

Note. The mean indicates the score difference between pre-test and post-test, a positive *M* value represents a gain in scores.

The Full Program

The Full Program involved 54 third-year kindergarten children, with 36 boys and 18 girls recruited from 3 kindergartens from districts representing low/medium/high SES backgrounds. The mean age of participants was 6 years 1 month ($SD= 3$ months).

Independent Samples T-test revealed a high level of between-group homogeneity in participants' background between the guided writing group and drawing group in terms of non-verbal intelligence, drawing skills and motivation, pre-test writing scores, literacy input from family, and parents' education level, with all p -values $>.05$. For the variability among 3 kindergartens, MANOVA results as shown in Table 2 indicated a significant difference in the domains of non-verbal intelligence, writing ability, literacy input from family and parents' education level, with all $p < .001$. However, there was no significant difference found in the drawing domain among 3 kindergartens, with $p > 0.5$. The significant mean difference in the major background domains was within expectation as it reflected the SES characteristics of the 3 kindergartens selected based on districts and school types, and SES was expected to have higher influence on children's intellectual performance rather than on children's drawing skills and motivation.

Table 2. *Demographic Information of Participants by Kindergarten (Full Program)*

	KG	N	<i>M</i>	<i>p</i>
Pearson's Test of Nonverbal Intelligence (TONI-4)	A	16	33.39	.00***
	B	18	40.37	
	C	20	45.60	
Drawing motivation	A	16	5.44	.87
	B	18	5.44	
	C	20	5.75	
Drawing skills	A	16	10.17	.06
	B	18	11.75	
	C	20	12.80	
Pre-test writing scores	A	16	15.89	.00***
	B	18	17.19	
	C	20	57.80	
Literacy input from family ^a	A	16	6.50	.00***
	B	18	5.19	
	C	20	10.70	
Parents education level ^b	A	16	1.47	.00***
	B	18	1.28	
	C	20	3.13	

Note. N=54

Results of 2-way MANOVA on post-program gains in writing scores

A 2-way MANOVA was conducted to investigate if there was a significant difference in children's text generation skills defined by text length (ww) and text complexity (tu) based

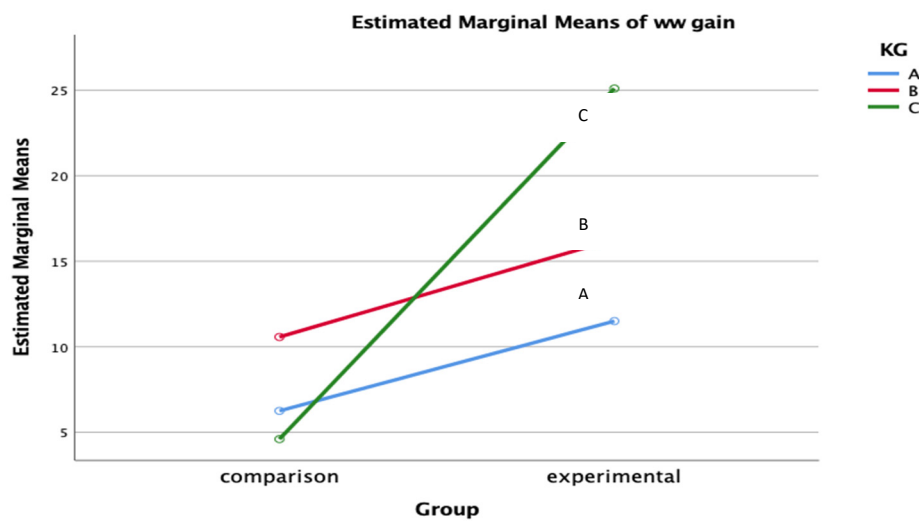


Figure 2. Graphical Comparison of Group and Kindergarten Program Effects in text length(ww) gain

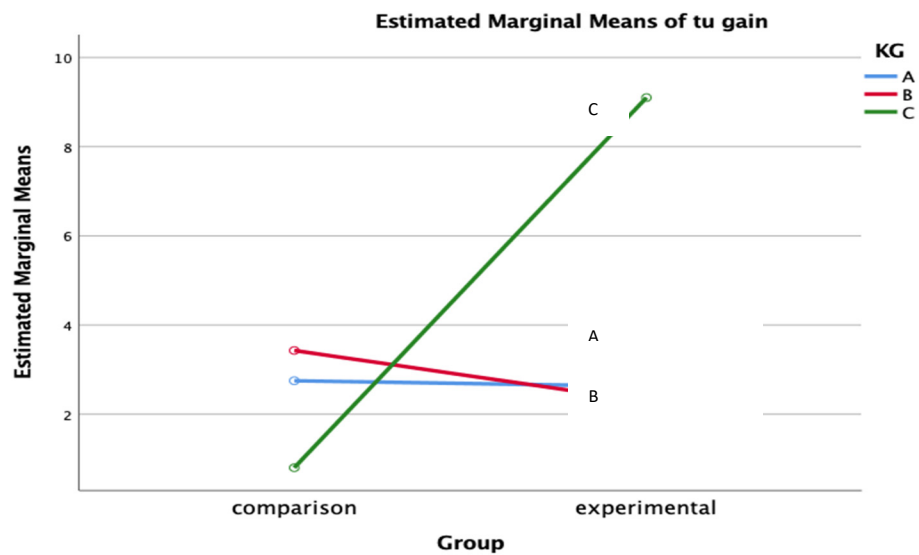


Figure 3. Graphical Comparison of Group and KG Program Effects in text complexity(tu) gain

on writing groups (drawing versus guided writing group) and school types (Kindergarten-A: low, Kindergarten-B: medium, Kindergarten-C: high SES/ L2 proficiency). After excluding participants who were not able to attend the post-test session and those who failed to fulfil the attendance rate, the total number of participants for analysis was 50 out of 54. Figures 2 and 3 showed the graphical comparison of the Group and Kindergarten Effects on (ww) and (tu) gains under the 2-way MANOVA analyses.

Table 3. 2-way MANOVA Results on Post-program Gains by Group and Kindergarten (Full Program)

Domain	Group	KG	<i>M</i>	<i>SD</i>	N
Post-program gains in text length (ww)	Guided writing	A	6.25	10.65	8
		B	10.57	7.16	7
		C	4.60	9.95	10
		Total	6.80	9.45	25
	Drawing-led	A	11.50	11.50	8
		B	16.29	5.28	7
		C	25.10	16.29	10
		Total	18.28	13.45	25
Post-program gains in text complexity (tu)	Guided writing	A	2.75	.89	8
		B	3.43	4.04	7
		C	.80	7.48	10
		Total	2.16	5.16	25
	Drawing-led	A	2.63	4.24	8
		B	2.29	1.70	7
		C	9.10	10.19	10
		Total	5.12	7.48	25

Note. N=50 (n=25 in each condition). The mean indicates the score difference between pre-test and post-test, a positive *M* value represents the score gains after the writing program.

The descriptive statistics between drawing and guided writing group in 3 Kindergartens were shown in Table 3. Overall speaking, the 2-way MANOVA results indicated that:

- 1) in text length (ww) domain: gains in drawing group > guided writing group (18.28 vs 6.80);
group difference in Kindergarten-C > Kindergarten-B > Kindergarten-A
(Kindergarten with high SES differed most);
- 2) in text complexity (tu) domain: gains in drawing group > guided writing group (5.12

vs 2.16);

group difference in Kindergarten-C > Kindergarten-B & Kindergarten-A
(Kindergarten with high SES differed most)

Significance of effects

Pillai's Trace was used to interpret the mean differences as shown in Table 3. It suggested the presence of a significant Group Effect at $p=.02$ and Kindergarten Effect at $p=.04$. The use of the more stringent Bonferroni method tested each ANOVA at a .025 (.05/2) alpha level to avoid Type 1 error. With this, the results demonstrated supporting evidence to reject the null hypothesis on between-group and between-kindergarten relationships with the dependent variables with degrees of freedom denoted by $F(3,42)=3.84, p=.02$ and $F(6,86)=2.34, p=.04$ respectively. The partial η^2 suggested a large effect size for both the Group Effect (partial $\eta=.20$) and Kindergarten Effect (partial $\eta=.14$), as the strength of relationship between groups and post-program growth in text generation skills accounted for 20% of variance of the dependent variables; and the strength of relationship between kindergartens and the post-program growth accounted for 14% of variance of the dependent variables.

Program effects on text length (ww)

There was a significant difference in the number of words produced (ww) between the guided writing group and drawing group, with $F(1, 44)=10.82, p=.002$. It indicated that the drawing group significantly outperformed the guided writing group in text length after the writing program. While the drawing group gained 17.63 words, the guided writing group gained 7.14 words as shown in the estimated marginal means. The program effect size was large with partial $\eta=.20$. As for the comparison of gains in (ww) among 3 kindergartens, there was no significant difference found as $F(2,44)=1.34, p=.27$.

Program effects on text complexity (tu)

No significant between-group difference was found in the length of the most complex sentence produced (tu), $F(1,44)=1.76, p=.19$. drawing group gained slightly more (tu) than the guided writing group in estimated marginal means ($4.63>2.33$). The effect size of .04 was considered relatively low as Group Effect accounted for only 4% of dependable variable

change. This result showed that children who drew before writing were not necessarily able to produce more complex text. However, when checking which kindergarten carried the most difference between two groups, it was noticed that larger between-group difference was found in the drawing group of Kindergarten-C (high SES/ L2 proficiency) in t_u ($9.10 > .80$) than the groups in Kindergarten-A and Kindergarten-B, with partial η of kindergarten effect=.14. As such, the analyses with kindergarten as a factor indicated that children's writing performance was affected by their L2 proficiency level under the drawing approach, the higher the proficiency level, the more complex text could be produced under the drawing-approach.

The impromptu-creative writing task

An additional creative writing task was included as a post-program measure to check on children's text generation skills gained from the Full Program. Children were given 15 minutes for ideation and another 15 minutes for writing. The experimental group adopted drawing as a pre-write strategy while the comparison group incubated ideas based on the story framework. Results on (ww) and (t_u) were compared by MANCOVA with pre-test scores as a covariance.

MANCOVA Results

After adjusting the means with pre-program scores as a covariate, the means for (ww) and (t_u) were recorded in Table 4, indicating that:

Table 4. *MANCOVA Results on Adjusted Means between Guided Writing and Drawing-led Groups (Full Program)*

Dependent Variable	Group	M^a	SD	M Difference	p
Creative writing text length (ww)	Guided writing	19.77	2.44	-8.88	.01
	Drawing-led	28.64	2.36	8.88	
Creative writing text complexity (t_u)	Guided writing	9.35	1.53	-1.97	.36
	Drawing-led	11.32	1.48	1.97	

^a Covariates appearing in the model are evaluated at the following values: PreWriteScoreTotal = 33.72.

- 1) in text length (ww) domain: drawing group > guided writing group (28.64 vs 19.77)

words) at $p=.01$ (significant);

- 2) in text complexity (tu) domain: drawing group > guided writing group (11.32 vs 9.35 words) at $p=.36$ (not significant)

The main results indicated that the adjusted mean vectors for multivariate of group difference were significantly different at the .05 level ($F=3.27, p=.05$) with a large effect size shown in partial $\eta=.14$. As for the Kindergarten Effect, the adjusted means among three kindergartens were shown in Table 5, with drawing group in Kindergarten-C (high SES/ L2 proficiency) outperformed the guided writing group more significantly than the groups in the Kindergarten-A and Kindergarten-B.

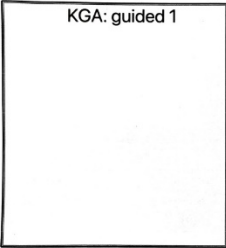
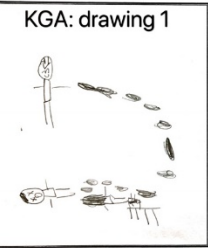
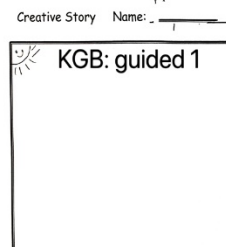
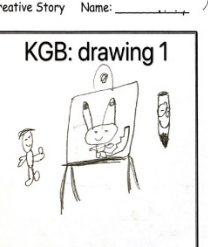
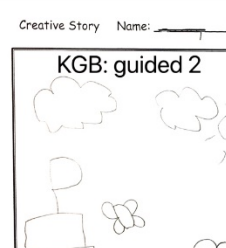
Table 5. *MANCOVA Results on Adjusted Means between Groups and Kindergartens (Full Program)*

Dependent Variable	Group	KG	M^a	Std. Error
Creative writing text length (ww)	Guided writing	A	18.87	4.49
		B	16.50	4.70
		C	23.92	3.98
	Drawing-led	A	21.04	4.25
		B	21.63	4.52
		C	43.25	4.52
Creative writing text complexity (tu)	Guided writing	A	7.95	2.80
		B	7.88	2.94
		C	12.22	2.49
	Drawing-led	A	8.03	2.66
		B	7.47	2.82
		C	18.45	2.82

^a Covariates appearing in the model are evaluated at the following values: PreWriteScoreTotal = 33.72

Qualitative analysis on Impromptu Creative Writing Test

Matching pairs from each KG were selected for qualitative analysis based on comparable between-group scores generated from the pre-test results in three domains: 1) drawing scores, 2) cognitive test scores, and 3) language proficiency scores. Figure 4 showed the seven matching pairs of samples from Kindergarten-A, B, and C.

Comparison Group (Guided writing)	Experimental Group (Drawing-led)
Creative Story Name: _____ When → Where → Who → What → How KGA: guided 1  It is a stormy day. You long There is a night. This is Mary marcus is scary marcus	Creative Story Name: _____ When → Where → Who → What → How KGA: drawing 1  This is Sun Tung Weng Sun Tung Weng is happy The girl monster has evil hair. She will kill people with her hair.
Creative Story Name: _____ When → Where → Who → What → How KGA: guided 2  Today is sunny day. There is a witch The witch name is Hilda. The witch is a cat.	Creative Story Name: _____ When → Where → Who → What → How KGA: drawing 2  Dia arrive! Dia bring the sunny boy Park Playing. Dia is a happy boy. Dia naughty cat cat is a happy.
Creative Story Name: _____ When → Where → Who → What → How KGB: guided 1  It is sunny day. There is a dog The dog is happy.	Creative Story Name: _____ When → Where → Who → What → How KGB: drawing 1  I like the Pikachu Magic Pen! Won the Pikachu can Moutel! I Love the magic Pen!
Creative Story Name: _____ When → Where → Who → What → How KGB: guided 2  It is a sunny day. There is a castle. This is a Rainbow.	Creative Story Name: _____ When → Where → Who → What → How KGB: drawing 2  It is super hot today. Elsa is very hot. Oh no!!! The Snow man is too hot The Snow man melts Elsa and the Chri

The Effects of Drawing on Children's Second Language Writing Skills via the Channel of Inner Speech

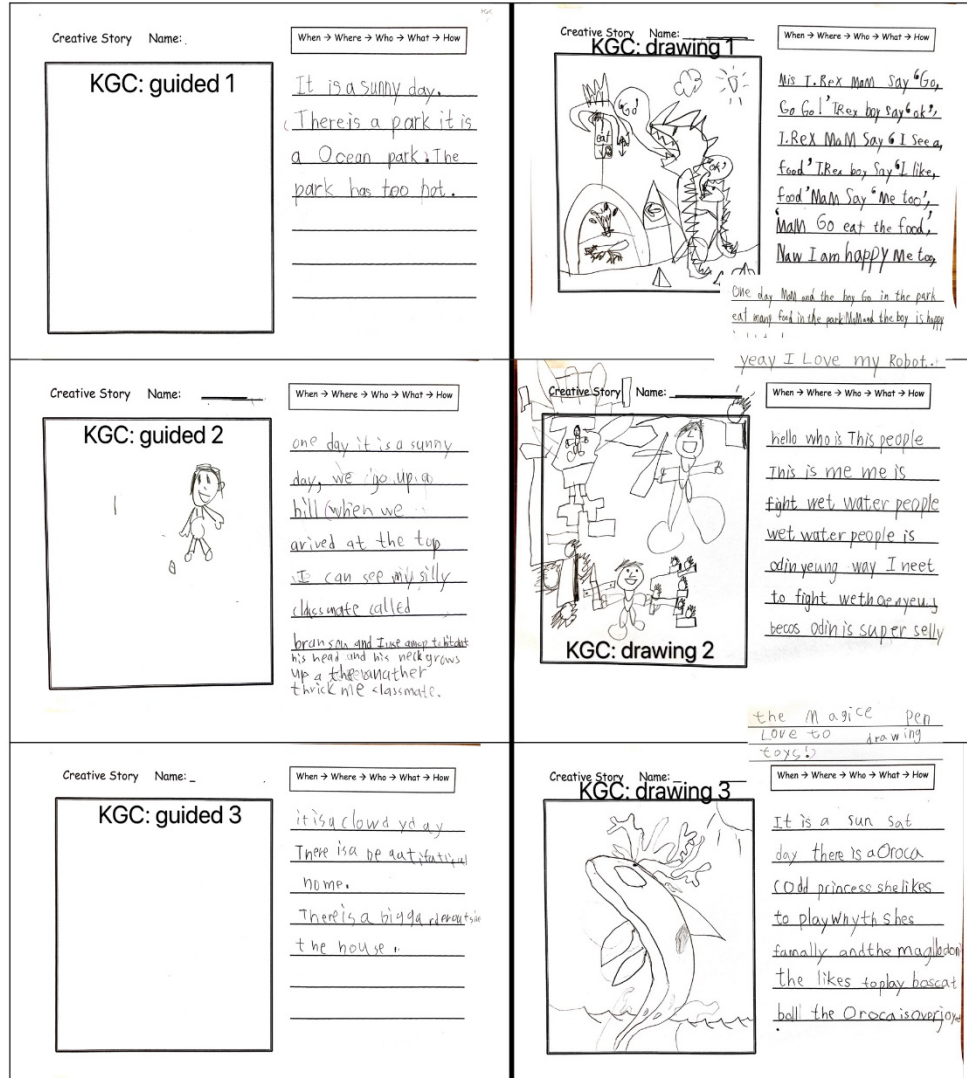


Figure 4. Samples of Impromptu Creative Writing Pieces

Children's writing pieces were analysed based on three linguistic factors contributing to children's writing development: syntax, semantics and pragmatics (Barroqueiro, 2010). First, syntax means the basic language rules such as how words are put together to form sentences. It was shown that children in the guided writing group were more aware of the syntactic appropriateness, they tended to formulate highly structured sentence patterns such as "It is a X day. There is a X. This is a X" and so on; while in the drawing group, syntactic structures

varied widely. Children showed a tendency to use a combined long and short phrases to elaborate ideas (e.g. Kindergarten-A: drawing 1) and highlight emotions (e.g. Oh no!!! in Kindergarten-B: drawing 2). The more creative use of language structures was also evidenced in the drawing group (e.g. beginning the story with “Hello who is this people” in Kindergarten-C: drawing 2; the use of dialogues in Kindergarten-C: drawing 1, despite identical language input from teacher for both groups throughout the 10 days of the writing program.

Second, semantics refers to the meaning of words that children come to understand the world. The themes of writing for the guided writing groups generally covered children’s daily experience with single subject such as “friends, dog, park, home, princess, castle”, whereas themes generated in the drawing groups entailed richer and more complex story elements, such as “hero and monster, magic pen, Elsa and snowman, T-Rex mother and son, classmate and robot, Orca in sunset”. Driven by a more imaginative theme, children in the drawing group naturally deployed a wider lexical range when putting their visual story in written form. As for the guided writing group, without visual images to guide the story development, children’s writing was very often blocked at the “what” stage of the storyline “when→ where→ who→ //(what) → how”. When encountering writer’s block, children generally showed tendency to retrieve from their memory or their “word bank” for any vocabulary they had learnt from the lesson, even with teacher’s encouragement to make up their own words to express ideas; whereas for drawing groups, children were more bold to express in their self-created lexicons such as “Won the Pikachu can moufe!= Wow the Pikachu can move!; bascatball= basketball; Oia arrive= O is arrive; becos=because; selly=silly”. When children’s cognitive ability and pre-test writing skills were controlled at comparable levels, and given teacher’s equal efforts in the first lesson to encourage invented spellings, it was shown that possible semantic difference in two groups was derived from the treatment effect.

Third, pragmatics is about the specific use of language in a social context to convey specific messages. As discussed, children in the guided writing groups seemed to be more conscious about the conventional use of language, while children in the drawing groups spontaneously used more “out-of norm” language forms such as using exclamation marks to replace full stops throughout the whole story in Kindergarten-B: drawing 1, and a triple-

exclamation mark “!!!” to express strong emotions in Kindergarten-B: drawing 2. Another example of having context shaping meaning was found in Kindergarten-C: drawing 2 with “...me is fight wet water people”. Pragmatically the word “wet” was considered redundant as it duplicated the commonly known nature of water. However, when the child intended to depict the main character as “wet water people”, a direct transcription from L1 to form a compound proper noun made a good sense for the child to carry on the flow of story creation. Similar to “Sun Tung Wong” in Kindergarten-A: drawing 1, the “Sun” there meant nothing relevant to the sun in the sky, instead, the child adopted the pronunciation of “Sun” in Cantonese to refer to its first language meaning of God to describe how powerful the main character was.

Apart from the linguistic features, children's writing pieces from the drawing group were also embellished with an extensive use of symbols which reflected children's active state of mind during the writing process, such as “the strokes around the sun to represent heat; arrows to indicate direction; speech bubbles to signify thoughts or dialogues; human figure with a thumb-up to show likeness”. The cognitive dual-task method involving a linguistic task designed for this Study sought to explore inner speech activity for young children (Langland-Hassan et al., 2015). When children were required to work on the writing task independently without teacher's support and peer collaboration, the process entailed subvocalization (Feinberg et al., 1986; Levine et al., 1982). The rich symbols to record meaning in the drawings served as a sign of active engagement in “sign creation” and “sign use” (Mackenzie & Veresov, 2013), where the use of expanded inner speech was considered typical for children at 6-7 of age when facing linguistic difficulties (Liva et al., 1994).

Comparison on the use of Inner Speech (IS)

Children were given a simple reflection form to report whether they had used IS during the writing processes during the program. Kruskal-Wallis Test indicated that the gain in number of words produced (ww) was significantly higher in the group who reported the use of IS ($H(1)=3.67, p=.05$) at $\alpha=.05$, but not in the gain of sentence complexity (tu) ($H(1)=.31, p=.58$) at $\alpha=.05$. Table 6 showed the inner speech comparison results.

Table 6. *Kruskal-Wallis Test Results for Inner Speech Comparisons*

	Inner Speech	N	Mean Rank	Kruskal-Wallis <i>H</i>	<i>df</i>	Asymp. <i>p</i>
Gains in text length (ww)	Yes	37	27.84	3.67	1	.05
	No	13	18.85			
	Total	50				
Gains in text complexity (tu)	Yes	37	26.18	.31	1	.58
	No	13	23.58			
	Total	50				

Discussion

The primary goal of this study was to evaluate the effectiveness of drawing on children's L2 text generation skills through a direct comparison with the guided writing approach. To evaluate whether the writing program was effective to achieve its goal, how the results answered the research questions (RQ) was discussed.

RQ. 1 on Text length (ww)

Would children who draw before they write be able to produce longer text, comparing with those who undergo instructional writing processes?

Highly consistent results were found in both the pre/post-test comparisons and creative writing test using Independent Samples T-test, 2-way MANOVA, and MANCOVA, pointing out that children were able to generate longer text when they were given a chance to write before writing. Concurred with preceding findings as in Olshansky's (2007) and Mackenzie's (2011) studies, the qualitative analyses on children's creative stories further revealed that drawing supported children by engaging them in a more elaborated thinking process that entailed more details, which in turn elicited spontaneous use of a wider range of descriptive language, less structured syntax, and a more creative use of pragmatics. Whereas children under the guided writing approach showed a tendency to be more language-cautious, leading them to a more accurate syntactic use but a halt of creation when in lack of vocabulary and expressions. This aligned with Reid's comments on guided writing, suggesting a tendency for children to limit their creative thoughts in writing as they followed too closely to correct structures, and focused on using guided skills to formulate correct utterances (Reid, 1993).

RQ. 2 on Text complexity (tu)

Would children who draw before they write be able to produce more complex text, compared with those who undergo instructional writing processes?

The MANOVA and MANCOVA results indicated that significant treatment effect of drawing on text complexity was present only among children who already reached certain L2 proficiency level. Despite richer content to write for when adopting drawing as a pre-write strategy, the ability to chunk fragmented ideas into long sentences still varied upon children's phonological knowledge to invent spellings and other linguistic knowledge to deliver ideas. One other possible explanation could be the intricate relations between children's development of inner speech and their ability to produce meaningful text being different between adults and children, as Adams' scientific research findings in 2013 suggested, inner speech might have a role in the conversion of ideas to linguistic form more directly in adult; but the role of inner speech in children during the process of writing could be more on the control and coordination of the writing constituents via an indirect rehearsal processes.

RQ. 3 on Inner speech (IS)

Would children in the drawing-led group report a higher rate of inner speech use at the end of the program?

Adam's research investigated the positive effects on how visual stimuli could stimulate inner speech to enhance young writers' text generation skills (Adam et al., 2013); while this study furnished the findings with data derived from self-created images. Kruskal-Wallis Test revealed that the gain in the number of words produced (ww) was significantly higher in the group who reported the use of IS. This finding implied that there might be a causal relationship between the use of IS and children's text generation ability. When the present study pointed out the possible relationship between these two variables, further research is warranted to investigate the mechanism of how phonological processing or L2 proficiency level interact with expanded inner speech to influence young children's ability to generate complex texts.

Limitations and curriculum implications

The present study showed consistent findings to support the role of drawing as an external mediator to facilitate young writers' writing performance. As for text complexity, it showed a first level of results indicating children's L2 proficiency level did have a moderating effect on the benefits of the drawing writing approach, but it did not generate further data on how and to what extent that the moderation had happened. To generalize the findings to other children with similar L2 background, further research on a larger sample size would be needed. The generalizability of the present study was limited by using a single sampled school to represent one level of SES even though several screening criteria were in place to uphold the SES representativeness. While considering the nuanced gender difference in early literacy skills suggested by some recent studies with a female advantage (Adams & Simmons, 2018; Lee & Al Otaiba, 2015), the skewed proportion of gender in the Full Program did not provide a viable analysis on gender differences.

When learning is still present without teacher-child, or child-child exchanging dialogues, the pedagogically implication may shift to become how teachers would initiate children's love in writing and nurture them into passionate writers beyond the normative class time. By encouraging children to write for leisure during recesses or holidays, setting a mini library in classroom to showcase each child's masterpieces and so on, "intra-personal" learning beyond normative class time could be promoted without burdening the densely packed mandatory curriculum. When positive "intra-personal" writing experience is first established and children become more autotelic in creating their own narratives, the "inter-personal" experience would then join in to celebrate and manifest children's success through opportunities to engage in active discussion via social speech during lessons. After all, having drawing as a legitimate sign system would help children express their knowledge in written form more easily (Mackenzie & Verosov, 2013) and it may help children transit from the oracy-based preschool curriculum to formal literacy in primary schools.

Conclusion

The findings from this study joined in preceding literature to suggest that when drawing

was used as a self-expressive tool to construct writing ideas, children became more effective in deploying mental resources to generate writing contents (Baghban, 2007; Olshansky, 2008). This study further revealed that relevant positive findings were found even without sensory stimulation effect from the manipulation of rich art materials or oral language effects from peer collaboration or discussion. Within the current educational climate of densely packed mandatory curriculum and the trend of prioritizing instructional approaches, advocating the seemingly time-consuming drawing as a pre-write strategy may seem counter intuitive. Nonetheless, findings from this study suggested that drawing may not necessarily be time-consuming and low yielding. In contrast, when children are equipped with the skills to tap on their own mental resources through drawing, promising writing performance such as increased text length and complexity can be elicited. Instead of serving as a decorative adjunct to writing, drawing should be better valued and utilized in the early L2 writing curriculum.

Ethical Declaration

This article was written based on the first author's doctoral thesis. Approval from the Guidelines for Survey and Behavioral Research Ethics Committee was received from the Chinese University of Hong Kong before any data collection procedures had started. Participants were fully informed of the data collection procedures and given opportunity to decline participation at any time.

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