2007/0450 (revised)

Part C. project details

Goals and Objective

Short term (those attainable within the project period)

1. To establish a school-based, theory-driven remedial programme for primary 2 and 3 students with specific reading difficulties (SpLD) in Chinese.
2. To develop a teacher-friendly manual for this school-based remedial programme.
3. To establish an e-learning centre for schools using this or related programmes to share teaching materials and teaching experience and for those professionals who are interested in learning to use the programme.

Long term (those attainable beyond the project period)

1. Continued enhancement of the current remedial programme.
2. Continued modification of the current remedial programme so that they can be tailor-made to suit the needs and existing resources of different schools.
3. To equip teachers with better theoretical knowledge on reading remediation for the better dissemination of their professional duties.

(a) Background: evaluation of the present situation that leads to the need for this project

The need for developing a school-based remedial programme for students with SpLD

The resultant remedial programme generated from the QEF funded project: A remedial programme to accelerate the reading abilities of primary 1 and 2 students (QEF 2003/0300) has been administered in clinics under Heep Hong Society (字得其樂), the developmental dyslexia clinic at HKU, a couple of resources centres and primary schools under Tung Wah Group of Hospitals (原來字有 fun). Adaptations have been made based on the specific needs of settings involved; consequently, the remedial programme designed in 2004 is now taking a number of different forms with more stringent on-going assessments and the development of treatment stages (Chung & Leung 2006).

Based on our experience in conducting the programme at different settings, school-based interventions appear to be much more effective. However, the programme in its current form requires heavy involvement of professional external to the school. It is worth the effort to convert it into a "school-based remedial support programme" for primary school to deal with children with learning difficulties.

Integrating children with special needs in general education programmes and enhancing school reforms to support an inclusive education has become a major trend in Hong Kong in the past few years. We are now much better in identifying students with SpLD in educational settings than we did 10 years ago. To accommodate SpLD children in classes, teachers are needed to be equipped with better theoretical knowledge and a school-based remediation programme for students with SpLD.

Given the structure of the remedial programme (once a week for 10-12 weeks), it fits particularly well to the Tier III of the "3-Tier Reading Model for Elementary Schools" (Vaughn Cross Center for Reading and Language Arts, University of Texas) which suggests a 10 to 12-week intervention plan, with the help of specialized reading teacher and other existing resources available to school. The result of the present proposed project should contribute constructively to the inclusive education reform and to the services provided to students with SpLD.

Since the completion of the QEF funded project(A remedial programme to accelerate the reading abilities, QEF 2003/0300), there have be a number of changes to the original programme to improve its efficacy. Below is the theoretical background of those changes:

Theoretical background of the new three-phase remedial programme

According to Nagy & Anderson (1999), learning to read is basically metalinguistic . It requires readers to become aware of the basic unit of spoken language, the basic unit of writing system and the mapping between the two. The present remedial programme hypothesizes that children with reading difficulties are kids who have normal intelligence but have not developed adequate metalinguistic skills which allow them to analyze the relationships between orthography, phonology and semantics, and to sort out the rules and apply them flexibly during reading. As a result these children with developmental dyslexia have to resort to rote memorization in reading (Snowling, 2000). The remedial programme is designed to foster the development of metalinguistic awareness and the flexible use of the orthographic phonologic correspondence strategies (phonological regularity and consistency rules) for primary students with developmental dyslexia.

A number of studies show that phonological awareness of the script–sound regularities correlates highly with success in learning to read English (e.g. Lundberg, Olofsson, & Wall, 1980; Lundburg, Frost, & Petersen, 1988). Unlike speaking and listening to others, reading is not a natural skill. It takes years of training (teaching) in school before one reaches the level of literary skills demanded by society. Learning to read is more like learning to play a game where basic rules have to be mastered; once a child has grasped the corresponding orthographic knowledge of the orthography in question, the child has acquired a powerful self-teaching device which allows further explorations of the print environment. This is supported by several studies which investigated the effect of phonological awareness training. (Alphabetic script: Gustafsson, Samuelsson & Ronnberg, 2000; Torgesen, Wagner & Rashotte, 1997. Chinese script: Ho and Ma, 1999; Ho, Wong & Chan, 1999).

Children in Hong Kong have to learn about four thousand characters by Grade Six (Leung & Lee, 2002). Simple non-divisible characters account for less than 10% of commonly used Chinese characters and the other are compound characters with more than one component (Wieger, 1965). Most of them are semantic-phonetic compounds, with 80% in adults' repertoire, 74% in primary school curriculum of Hong Kong and 72% in elementary Chinese textbooks of mainland China (Chen, 1996; Shu, Chen, Anderson, Wu & Xuan, 2003).

It has been shown that phonetic and semantic radicals would be activated in the recognition, reading aloud and reading comprehension of low frequency Chinese characters (e.g. Li & Chen, 1997; Wu & Liu, 1997; Yang & Peng, 1997). For example, the phonetic radical 象 / tsJN6/ [elephant] and semantic radical 木 /muk9/ of the character 橡 / tsJN6/ oak tree] may be activated for recognition and access to pronunciation and meaning of the character. This submorphemic processing in Chinese has been confirmed by studies on frequency effects of radicals, phonological regularity effect (regular characters read better than irregular characters), and phonological consistency effect (consistent characters read better than inconsistent characters) (e.g. Ho & Bryant, 1997; Hue, 1992; Shu, Zhou, & Wu, 2000; e.g. Taft & Zhu, 1997; Yang & Peng, 1997). The metalingusitic awareness of sub-character unit in Chinese writing system is the pre-requisite of sub-morphemic processing. The use of regularity and consistency rules were found to be better developed in advanced readers than in beginners (Kwok, 2003, Yip, 2004). It is also found that the normal children applied the rules significantly more often than the dyslexic children (e.g. Ho, Wong & Chan, 1999; Snowling, 2000).

However, the application of regularity or consistency rules alone does not guarantee accurate reading, rather the flexibility in rule application is equally important. According to the Hong Kong Corpus of Primary School Chinese, HKCPSC (Leung & Lee, 2002), absolute regular and consistent characters comprised less than 50% of all characters (Table 1). If children apply the

regularity and consistency rules in reading all semantic-phonetic compounds, they would get more than half of the characters wrong.

Table 1. Distribution of characters across grades

Category \ Grade	1	2	3	4	5	6
Regular consistent	10%	11%	10%	10%	10%	10%
Regular inconsistent	3%	5%	6%	7%	8%	8%
Irregular consistent	17%	12%	9%	8%	7%	6%
Irregular inconsistent	18%	21%	23%	26%	27%	27%

As shown in Table 2, if children applied regularity rule to all of the four characters, they would get only two of them correct. They would get one character correct if he only applies the consistency rule. To get all of the four characters right, children have to apply regularity to character 1 and 2 and apply consistency rules to character 3 and 4. Reading accuracy is dependent on, first the awareness of regularity and consistency, and second the appropriate application of rules to different categories of characters, i.e. flexibility.

Normal readers learn to apply phonological regularity and consistency rules flexibly without explicit instructions in learning Chinese characters (Shu & Anderson, 1999). To develop the regularity awareness of a character (e.g. 爐 /lou4/ [stove]), one must know the phonetic radical of the character (e.g. 盧/lou4/ [cottage]). The understanding of phonological consistency also requires the knowledge of characters in the family (e.g. 驢 /lou4/ [donkey], 顱 /lou4/ [skull] and 鱸 /lou4/ [perch]). The reduced character repertoires of dyslexic children further jeopardizes the development of the required metalinguistic awareness.

Table 2. The effect of applying regularity and consistency rules on reading different categories of characters

	Regular Consistent	**Regular inconsistent**	**Irregular consistent**	**Irregular inconsistent**
Example:	爐 /lou4/	完 /jyn4/	溉 /k^{h}Oi3/	冠 /kun3/
Phonetic radical:	盧 /lou4/	元 /jyn4/	既 /kE3/	元 /jyn4/
Use of regularity rule	盧 /lou4/ *Right*	元 /jyn4/ *Right*	既 /kE3/ *Wrong*	元 /jyn4/ *Wrong*
Use of consistency rule (orthographic analogy from the same family)	/lou4/ (爐, 驢, 顱, 鱸) *Right*	Three possible answers: 冠 /kun3/ or 玩 /wun6/ or 頑 /wan4/ *Wrong*	/ k^{h}Oi3/ (概,溉,慨) *Right*	Three possible answers: 完 /jyn4/ or 玩 /wun6/ or 頑 /wan4/ *Wrong*

By fostering the flexible application of phonological regularity and consistency rules in reading, the reading performance of dyslexic children will improve. Flexibility refers to the ability to decide appropriately when to apply rules and what rules to apply. A mature reader would apply the regularity rule in reading 爐 /lou4/ [stove] (a regular consistent character). However, consistency but not regularity rule is applied in reading 溉 /k^{h}Oi3/[irrigate] (an

irregular consistent character). Neither regularity nor consistency rule would be applied in the reading of 冠 /kun3/ [champion/hat] (an irregular inconsistent character). Flexibility is fostered by, first of all, establishing the awareness and rules and then by training the ability to determine when to apply the rules by introducing regular versus irregular, consistent versus inconsistent characters selected for the training.

Project Description

(a) goals and objectives

Three major goals of the present project

The first goal is to establish a school-based, theory-driven remedial programme for primary 2 and 3 students with specific reading difficulties (SpLD) in Chinese (primary 2 students are chosen instead of primary 1 is because of two major factors: first, at the beginning of primary 1, the levels of students vary according to their pre-school training this large variability might affect reliability of pre-treatment assessment negatively), second, teacher may take time to confirm the problem of students after their admissions). The training programme is divided into three phases. To proceed to the next phase of training, each participant has to acquire the skills targeted in the previous phase. The successful completion of a phase is detected by the results of a post-treatment probe test conducted after each treatment session. In the first phase (RC), the awareness of regularity and the application of the regularity rule are fostered. After the application of regularity rule is consolidated, the second phase (IRC) aimed at fostering the awareness of consistency and the application of consistency rules. The third phase (RIC & IRIC) focuses on the flexible application of regularity and consistency rules. Treatment materials needed for each of the phases and post-treatment probe test will be prepared in a way that all materials can be re-used.

The second goal is to develop a teacher-friendly manual for school-based remedial programme. A school-based team will be set up based on the availability of existing resources of individual school. We plan to implement a 10-week, two-hour per week training making use of the existing resource in school for 6-10 primary 2 and primary 3 students with SpLD. It is expected that one to two teachers, parents of the targeted children (dependent on their availabilities), six to ten student helpers from primary six or primary five, school-based social worker, psychologist and teacher assistant/learning support assistant will participate in the programme. Once the stimulus materials and the programme plan are ready, all participants will be trained to implement the remedial programme. On top of the weekly two-hour training, student helpers are expected to run two rehearsal sessions, 10 to 15 minutes each across the week. The running of the programme will be monitored through regular evaluation sessions. Children are taught a set of stimulus characters each day in a well-ordered sequence that exemplifies critical phonological, orthographic, semantic and orthographic principles. After each session, each participant will fill in an evaluation form which aims at gathering their feedback on their participation and the programme. The data collected will be used for the construction of training provided for the participants and for the modification of the remedial programme. A teacher manual will be written up to ensure sustainability of the programme.

The third goal is to create on the internet an e-learning centre for schools using this or related programmes to first, share teaching materials and teaching experiences and second, for teachers and relevant professionals who would like to learn to use the remedial programme. By using interactive computer programmes, relevant tasks can be set up so that users can

work their way from the lowest hierarchy to the highest through online feedback provided in the course of their learning. More professionals will be making use of the programme to help student with SPLD and it is expected that it will further enhance the adaptability of the remedial programme to different settings.

Subjects

Forty P.2 and P.3 students who are identified as SpLD in 2 local primary schools will be recruited. The following standardized tests, namely the Raven's Standard Progressive Matrices (Raven, 1986), and the Hong Kong Graded Character Naming Test (Leung, Lai & Kwan, 2008) will be administered to confirm their candidacies.

Treatment schedule

A school-based team will be set up in each of the participating schools. One teacher and/or student guidance teacher (SGT) or student guidance personnel (SGP) and six to ten volunteers student helpers will be recruited. The project team will provide the training for teachers, SGT/SGP who will in turn train up their student helpers at start and the training will eventually be provided by the e-learning centre developed.

The remedial programme will be conducted twice in each participating school across two semesters (Oct to Dec & March to May) in one academic year. All the treatment sessions will be run by existing personnel at school plus parents of students with dyslexia. A total of four remedial programs, two in each of the two participating schools will be conducted according to the following schedule:

1st year in school A		2nd year in school B	
1st semester	2nd semester	1st semester	2nd semester
1st remedial programme	2nd remedial programme	1st remedial programme	2nd remedial programme

Materials and stimuli

All the treatment stimuli will be selected from the Corpus of Hong Kong Chinese characters (Leung & Lee, 2000). The Corpus of Hong Kong Chinese characters contains all Chinese characters from the Chinese and general-study textbooks used in Primary schools. All the character frequencies mentioned below refer to the number of occurrence of the characters in the children's Chinese and general-study textbooks calculated cumulatively according to the different grades. Each character is coded according to its phonological regularity and phonological consistency. As the development of phonological awareness is closely related to the set of characters to which the children are being exposed, each stimulus character will be chosen on the basis of their phonological regularity and consistency to foster the development of metalinguistic awareness described above.

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The target beneficiary group

All Primary school students with reading difficulties and their parents, all Chinese Subject teachers, all speech therapists and psychologists who are involved in supporting primary students with reading difficulties.

Extent of teacher and principals involvement in the project

The school principal, teacher, student guidance teacher (SGT) / student guidance personnel (SGP), teacher assistants/learning support assistant, parent volunteers and primary student helpers will be involved in all three phases (the RC phase, IRC phase and the RIC & IRIC phase) of the programme.

For each remedial programme, it is estimated total of 36 hours of work is required from a school member of the participating school. The nature of participation will include recruitment /assessment of students, preparation of treatment materials, training on the theoretical background as well as the implementation detail of the programme. Since we plan to run the programme twice in each school, a total 70 man-hour from each school are expected.

Implementation Plan with time-line for one semester

Time-line of the 19-week remedial programme

Week	Activities		People Involved
1st to 4th	Preparation of treatment materials		Research assistant
5th to 7th	Recruit students		Research assistant plus participants
	The setting up and the training of treatment team**		
8th week	Pre-treatment assessment		Students with dyslexia Relevant professionals
9th week	Introduction Rehearsal Character Awareness & Probe-test	***Phase I and mid-week rehearsal:*** RC – (Awareness and application of the regularity rule)	Students with dyslexia Responsible Teacher and TA Student Guidance Teacher (SGT) / Student Guidance Personnel (SGP) Parent Volunteers Student helpers
10th week	Introduction Rehearsal Character Awareness & Probe-test		
11th week	Introduction Rehearsal Character Awareness & Probe-test		
12th week	Introduction Rehearsal Character Awareness & Probe-test		
13th week	Introduction Rehearsal Character Awareness & Probe-test	***Phase II and mid-week rehearsal:*** IRC - (Awareness and application of consistency rule)	Students with dyslexia Responsible Teacher and TA Student Guidance Teacher (SGT) / Student Guidance Personnel (SGP) Parent Volunteers Student helpers
14th week	Introduction Rehearsal Character Awareness & Probe-test		
15th week	Introduction Rehearsal Character Awareness & Probe-test		
16th week	Introduction Rehearsal Character Awareness & Probe-test	*Phase III and mid-week rehearsal*:	Students with dyslexia Responsible Teacher and TA Student Guidance

17th week	Introduction Rehearsal Character Awareness & Probe-test	RIC & IRIC stage- (Flexible application of regularity and consistency rules)	Teacher (SGT) / Student Guidance Personnel (SGP) Parent Volunteers Student helpers
18th week	Introduction Rehearsal Character Awareness & Probe-test		
19th week	Post-treatment assessment		students with dyslexia Relevant professionals

I. Introduction (25min): Based on the treatment stage the child is at, selected characters are introduced in multi-character word context. It involves the explanation of the orthographic – phonologic(形音) and the orthographic – semantic (形義) links through the use of simple games on one-to-one or one-to-two basis.

II. Rehearsal (25min): Rehearsal of the characters introduced in the *Introduction* part through group games.

III. Character Awareness (25min): While characters in both Part I and Part II are introduced in multi-character word context, Part III fosters the development of character awareness through group games.

IV. Probe-Test (5min): A test designed to capture the change of reading strategies. The result of the test is the basis on which the change of stage is decided.

** The Treatment Team should be consisted of a teacher, teacher assistant, SGT/SGP, parent volunteers and/or student helpers.

The above programme will be conducted twice in each of the participating school according to the following schedule:

1st year in school A		2nd year in school B	
1st semester	2nd semester	1st semester	2nd semester
1st remedial programme	2nd remedial programme	1st remedial programme	2nd remedial programme

Implementation manuals for teachers and other related participants will be distributed to individuals at different stages of the programme. A finalized manual will be produced at the end of the project.

Regarding the e-learning centre, an experimental webpage will be set up by Dec 2008. Through trail runs in the two schools by different participants, the e-learning centre will be finalized by Sep 2010.

The exact period of the project should start by Oct, 2008 and end by Sep, 2010.

(i) expected deliverables and outcomes

A school based dyslexia remedial package for P.2 and P.3 will be developed. Each package will include sets of Chinese characters stimuli, word stimuli, probe test materials and activities specific to P.2 and P.3, detailed manuals for users (teachers, parents, student helpers and other related professionals) with training guidelines for teachers to train up parents and student helpers. A video demonstration on the implementation of the programme will also be included in the manual.

A e-learning centre on the Internet will be available for users to share their teaching materials developed and their implementation experiences and for those relevant professional who would like to learn to use the remedial programme.

(j) budget with detailed breakdown; whether there are matching contributions or other sponsorship and if so, the details

	year 1	year 2	total
Salary			
Project officer	180,000.00	180,000.00	360,000.00
($15,000 (5% MPF included) X 24 months)			
student research assistant(for treatment and training)	15,000.00	15,000.00	30,000.00
technical assistant		30,000.00	30,000.00
		subtotal: HKD420,000.00	
Equipment			
Hardware			
Data Base workstation x 2	35,000.00		35,000.00
printer x 2	2,000.00		2,000.00
Scannerx2	2,000.00		2,000.00
Memory sticks	1,000.00		1,000.00
Software			
FileMakerPro (中文)(for database)x3	3,750.00		3,750.00
		subtotal: HKD43,750.00	
General expenses			
Consumables	6,950.00	3,000.00	9,950.00
Expenses relating to manual printing		10,000.00	10,000.00
Expenses relating to seminar		5,000.00	5,000.00
		subtotal: HKD24,950.00	
		Grand total: HKD488,700.00	

Job descriptions of the research assistant (RA), student research assistant (student RA) and technical assistant

Project Officer:

Prepare Chinese character stimulus for P2 and P3 programme (it involves selecting appropriate Chinese characters for treatment from the data corpus);

Contacts of personnel involved in the project (teachers, parents and speech therapists);

Organize training for teachers, parents, student helpers, teaching assistants, social workers, and psychologists;

Organize and administer pre-treatment assessment of subjects;

Organize the collection of data before, during and after the implementation of the programme;

Data Analysis; and

Drafting the treatment packages for future users.

Student RA:

Data Collection;

Assessment of subjects; and

Assist training parents, teachers, school-based personnel and primary student helpers.

Technical assistant:

The establishment of a website for sharing of treatment materials developed.

Justifications for the monthly salary of project officer (PO):

A PO will be employed under the regulations set by HKU. The monthly salary for a project officer is $15000.00 in the 1st year and the 2nd year. It is expected that the PO should have some years of experience in the field of specific reading difficulties and can handle database.

Justification for the hourly rate for student RA and technical assistant:

The hourly rate for relatively senior student RA is HKD 60 per hour. Two student RAs will be needed. Each of them will work for about 250 man-hour in each year (total 500 man-hour) for the training and maintenance work after the implementation of the programme.

Technical assistant will be employed using the same salary scale. An estimation that a total of 500 hours of work is needed for the webpage establishment and the video editing for the manuals.

Project Impact

(k) evaluation parameters and method

To examine the effectiveness of the treatment approach and to measure the efficacy of the current programme, the following information will be obtained:

1. Post-treatment evaluations and the evaluation forms of different participants after each remedial session;

2. The results of probe tests administered after each remedial session;

3. The pre- and post-treatment score on standardized tests - the Hong Kong Graded Character Naming Test (Leung, Lai & Kwan, 2008);

4. The pre- and post- treatment relative academic positions (Chinese subjects) in class:
   i. The nearest academic examination results before the treatment
   ii. The nearest academic examination results after the treatment
   iii. The second nearest academic examination result after the treatment.
   iv. The third nearest academic examination result after the treatment.

5. Questionnaires to teachers, student helpers, parents and other participants to capture their feedback on the administration of the programme and the usefulness of the draft manuals across semesters

The data obtained should allow us to examine the effect of the treatment and changes of effect size across time. The difference between groups having treatment in 1st semester vs group having treatment in 2nd semester would review the best time to conduct the programme. The changes of effect size across time will inform us about the maintenance of treatment effect.

(l) how the project would benefit the education sector as a whole

The outcome of this project will be a cost effective remedial programme(it involves minimal efforts from paid staff with the participation of parents and student helpers) for children with specific reading difficulties. It also serves to equip teacher with a theory-driven remedial programmefor students with SpLD.

Integrating children with special needs in general education programmes and enhancing school reforms to support an inclusive education has become a major trend in Hong Kong in the past few years. To accommodate SpLD children in classes, teachers are needed to be equipped with better theoretical knowledge and a school-based remediation programme for students with SpLD. Given the structure of the remedial programme(once a week for 12 weeks), it fits particularly well to the Tier III of the "3-Tier Reading Model for Elementary Schools" (Vaughn Cross Center for Reading and Language Arts, University of Texas) which suggests a 10 to 12-week intervention plan, with the help of specialized reading teacher and other existing resources available to school. The result of the present proposed project should contribute constructively to the inclusive education reform and to the services provided to students with SpLD.

The result of the current study should provide an informative basis for a review of current language mainstream syllabus, textbooks to enhance the integrative effectiveness of the remedition programme on mainstream curriculum.

(m) how the outcomes of the project can be sustained beyond the completion of the project

Materials developed from the project are designed for P.2 and P.3 students who are having specific reading difficulties. In theory, the package can be reused year after year for those P.2 and P.3 students. Teachers, student helpers, other school-based personnel and parents who have participated in this project should be able to implement the same programme to P.2 and P.3 students in the coming years. As long as the curriculum for primary school remains about the same, the school-based programme can be run in other schools, year after year.

The establishment of an Internet platform for schools using this or related programmes to share teaching materials and teaching experience enable further modification of the programme to suit different needs specific to individual schools.

(n) dissemination/publicity methods

1. A school-based remedial programme package of the dyslexia treatment will be prepared for dissemination to schools and interested educators.
2. Training and sharing sessions will be organized for teachers and parents of schools interested in this programme.
3. The results of the study will be posted in the e-learning centre established.
4. Dissemination of findings in various international conferences.
5. Publications in relevant international journals.