

*Further Evaluation on the Implementation of
the Medium of Instruction Guidance for
Secondary Schools*

*Final Report
(2002-2004)*

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EXECUTIVE SUMMARY

1. The Research Questions

The research team was commissioned by the Education Department (ED) of the Hong Kong Special Administrative Region (HKSAR) Government to undertake this study, commencing from the start of the 2002/2003 school year. The Study is entitled *Further Evaluation on the Implementation of the Medium of Instruction Guidance for Secondary Schools*. (ED, 2002) It follows a longitudinal research which commenced in September 1999, and extends the Initial study for a further two school-years, up to the summer of 2004. Sampled students' academic and psychological development was traced to their exit point from Form 5, or more precisely, their sitting the Hong Kong Certificate of Education Examinations. The research questions investigated are defined as follows.

- (a) to find out
 - the effects of different MOI arrangements at senior levels on students' learning, e.g. their academic performance, personal development, language ability and high-order thinking skills;
 - the major factors that enhance/hinder students' learning in Chinese or English MOI at senior secondary levels; and
 - the major factors that enhance/hinder the introduction of English as MOI in whole or in part only at senior secondary levels.
- (b) based on the findings, to design/recommend measures that support students' learning under different MOI arrangements for their whole secondary schooling." (Tender ref. ED/P&R/EMICMI/02, p.24-25)

2. The Study

To address these research questions, the research team studied a sample comprising two cohorts of students from 98 secondary schools, being the same students as in the Initial Study. They were students who entered into the secondary education system in the academic years of 1998-1999 (98-cohort) and 1999-2000 (99-cohort). The 98 secondary schools were sampled by stratified random sampling based on three criteria. The first of these was the Medium of Instruction (MOI) used, this being either English as Medium of Instruction (EMI) or Chinese as Medium of Instruction (CMI). The second was the achievement level of the student intakes of

CMI schools, categorized as high, medium or low. As the sampled students advanced to Form 4, MOI streaming took place in some of the sampled CMI schools, and this became the third criterion in sampling of schools. Accordingly, the four sampling strata adopted in the Initial Study are further divided into seven strata in this follow-up study, namely, EMI, CHIGE, CHIGC, CMIDE, CMIDC, CLOWE, and CLOWC. 24 EMI, 25 CHIG, 25 CMID and 24 CLOW schools participated in the Study.

Over the two years of the Study, the two cohorts of students were tracked from Form 4 to Form 5 and studied by means of achievement tests, questionnaire surveys, classroom observations, and most importantly, their HKCEE results. Owing to the SARS outbreak, the scheduled focus group discussions with sampled students during lunchtime had to be forgone because face-to-face dialogues during lunch were strictly prohibited in schools in the aftermath of SARS. Finally, teachers in the sampled schools were also studied, using questionnaire surveys and in-depth interviews.

3. Major Findings

Based on the data collected in the two years, the research team designed the following analysis to answer the research questions.

3.1. Patterns of MOI Switching at Senior Forms

As revealed in the Study, a considerable number of students in the CMI schools in the sample switched to EMI mode in their senior secondary years. The switch from CMI to EMI was basically determined by two factors, namely, the nature of the subjects being studied and the academic ability of the students. The nature of subjects can be characterized as the degree of literate demand of HKCEE subjects. It is evidenced by the findings that the percentages of CMI students switching to EMI mode are in congruence with the degree of literate demand of the HKCEE subjects. For science-stream students, percentages of students switching to EMI mode are in descending order from Additional Mathematics, Mathematics, Physics, Chemistry, to Biology. For arts- and commerce-stream students, the respective percentages are in descending order from Principles of Accounts, Mathematics, Economics, Geography, to History.

Considering the academic ability of students, it is revealed that the criterion works at both between- and within-school levels. For the between-school level, the proportion of CMI students switching to EMI mode decreases from CHIG, CMID to CLOW schools. Also, CMI students with higher AAI, Form-3 achievements in English, integrated science, and social studies are more likely to switch to EMI mode in their

senior secondary years. For the within-school level, in CMI schools which have set up mixed EMI and CMI modes in senior forms, students who switched to EMI at senior forms show, on average, significantly higher academic-ability levels, especially in English, by comparison with their peers who remained in CMI mode. Moreover, these academic-ability differentiations in MOI switching are much more salient among science students, who are generally high achievers among senior-form students in the HK secondary school system.

3.2. Academic Development

In assessing the differential effects of senior-form MOI arrangements on students' academic development, their HKCEE results in twelve subjects, which are the most popular in terms of numbers of candidates, were taken as measures of students' academic outcomes. They were Chinese language, English language (Syllabus B), Mathematics, Additional Mathematics, Physics, Chemistry, Biology, Economics, Geography, History, Chinese History and Principles of Accounts. A series of multi-level regression analyses and means comparisons among value-added measures were conducted on this data.

The most salient effects of senior-form MOI arrangements on HKCEE results were found in social subjects, namely Economics, Geography and History. Value-added advantages over EMI students in social subjects in junior forms remained up to Form 5 for CMI students who have remained in CMI mode in senior forms, but lost for CMI students who have switched to EMI mode in senior forms as indicated by the HKCEE results. Furthermore, as revealed in the means comparisons of value-added measures, CMI students who remained in CMI mode in senior forms have significant value-added advantages as a group over CMI students who switched to EMI in senior forms in HKCEE results in all three social subjects under analysis.

The MOI-streaming effects on HKCEE results in science subjects are less consistent compared with those in social subjects. The significant value-added advantages of CMI mode on science achievement found in junior forms have almost disappeared in the HKCEE results in Physics and Chemistry, especially in CHIG schools. The value-added advantages in science subjects over EMI students in junior forms only remained apparent up to the HKCEE results in Physics and Chemistry among CLOW students, most of whom have remained in CMI mode. Furthermore, no consistent and significant value-added advantage was found between CMI students who remained in CMI mode and those CMI students who switched to EMI in senior forms in the HKCEE results in Physics and Chemistry. In the case of the HKCEE results in Biology, the value-added advantages over EMI students in science subjects in junior forms remained up to Form 5 for CMI students who had remained in CMI

mode in senior forms, but was lost for CMI students who had switched to EMI mode in senior forms as indicated by the HKCEE results in Biology. Furthermore, as revealed in the means comparisons of value-added measures, CMI students who remained in CMI mode in senior forms have significant value-added advantages as a group over CMI students who switched to EMI in senior forms, from the HKCEE results in Biology.

Looking at English achievement, the value-added advantages of EMI schools on junior-form English achievement remained up to Form-5 as indicated by HKCEE results in English (Syllabus B), which were especially significant when compared with CHIG and CMID schools. However, EMI students' value-added advantages over CLOW students became statistically insignificant in HKCEE results in English (Syllabus B). This can be explained by the selection effect, that is, most CLOW students (more than two-thirds) opted for HKCEE English (Syllabus A) and only the top one-third chose to sit for English (Syllabus B).

In Chinese achievement, in contrast to the insignificant value-added effects found in junior forms, senior-form students in all three CMI strata have value-added advantages over EMI students in HKCEE results in Chinese language. The difference in findings between the two studies can be explained by the fact that the value-added effect of CMI schools on Chinese achievement may require a longer time to take effect. Furthermore, it was found that the three ability strata in CMI schools did not differ significantly in their value-added effects in Chinese language.

Finally, no significant and consistent MOI-streaming effect on HKCEE results was found in Mathematics, Additional Mathematics, Chinese History and Principles of Accounts.

3.3. *Psychosocial Development*

In this phase of the Study, to assess the differential effects of different MOI and ability streams on students' psychosocial development, six dimensions were examined. They were (1) self-concept, (2) learning motive and strategy, (3) attitudes towards bilingualism and English learning, (4) readiness to use English, (5) perception of quality of school life, and (6) educational aspiration. After a series of multi-level regression analyses, the findings revealed that there are significant and consistent differential effects between EMI and CMI schools on several areas of students' psychosocial development. These are students' *English Self-concept*, *Surface Strategy* in learning, *Interest in English*, feeling of *Difficulties in Learning English*, *Readiness to Use English*, *Sense of Linguistic Efficacy Relating to the MOI in Use in Schools*, and *Educational Aspiration*.

Among the seven self-concepts under research, it was found that the academic *Self-concept of English* shows a significant and consistent difference between EMI and CMI students. More specifically, EMI students' *Self-concept of English* is consistently and significantly higher than CMI students' in all three ability strata, across the two cohorts and throughout the senior-secondary years. Taking together the same pattern of results found in junior forms, it is evident that EMI students have higher *English Self-concept* than CMI students throughout all the secondary years of schooling.

The second area of psychosocial development, which showed significant differences between EMI and CMI students, is students' learning strategy. Among the three dimensions of learning strategy, *Surface Strategy* has produced some significant and consistent differences. CLOW students are less likely to adopt *Surface Strategy* in learning than EMI students in both cohorts. It may indicate that CLOW students have the tendency to not comply with teachers' instructions and requirements in classroom teaching.

The third area of psychosocial development, which produced significant differences between EMI and CMI students, is students' attitude towards English learning. Among the three dimensions of attitudes towards English learning, significant differences are found in *Interest in English* and sense of *Difficulties in Learning English*. EMI students expressed greater interest in English learning than CHIG and CMID students in both cohorts. Given the consistent finding in Junior-Form Study, it indicates that the difference in interest in English learning persists throughout all the years of secondary study. Furthermore, CMI students in all three ability strata had a greater sense of difficulties than EMI students in English learning.

The fourth area of psychosocial development, in which significant differences between EMI and CMI students was exhibited, is students' readiness to use English. Specifically, EMI students are more ready to use English with foreigners, with the mass media and in class, than CHIG students. The EMI students are also more ready to use English with foreigners than CMID students.

The fifth area of psychosocial development, which produced significant differential effects between EMI and CMI schools is students' perception of the quality of their school life. Between the two dimensions of quality of school life, only the *Sense of Linguistic Efficacy Relating to the MOI in Use in Schools* has consistently produced significant differences between EMI students and CMI students across the two cohorts. CMI students who remained in CMI mode in their senior forms have consistently indicated greater *Sense of Linguistic Efficacy* across the three ability strata

when compared with EMI students. In contrast, CMI students who have switched to EMI mode did not have significant difference in *Sense of Linguistic Efficacy* compared with EMI students. Furthermore, there is no consistent differential effect between EMI and CMI students in their *Perceived Opportunity Relating to the MOI*.

Finally, it was revealed that there are stratifying effects on educational aspiration among the MOI and ability strata, i.e. EMI, CHIG, CMID and CLOW. EMI students hold the highest long-term and short-term educational aspirations. The proportion of students who hold high educational aspiration decreases in the sequence of stratum EMI, CHIG, CMID to CLOW. Meanwhile, the proportion of students who hold low educational aspiration increases in sequence from EMI, CHIG, CMID to CLOW stratum. Furthermore, as in CMID and CLOW schools, students who have switched to EMI mode hold higher educational aspirations than those who have remained in CMI mode.

3.4. Explanations

Six tiers of factors were explored to account for the differential outcomes of EMI and CMI students. Among them, students' pre-entry attributes, which include AAI, SES at individual level and school-means level, and students' gender, are the most salient factors in accounting for students' HKCEE results. Among the twelve HKCEE subjects under study, pre-entry attributes have the greatest effects on Chinese and English (Syllabus B). The pre-entry attributes accounted for more than 40%, on average, of the total variance in the HKCEE scores in these two language subjects. The effects of pre-entry attributes on HKCEE results in Mathematics, Physics, Chemistry, and Principles of Accounts are also substantial. The pre-entry attributes have some effects on HKCEE results in Additional Mathematics, Biology, Economics, and Chinese History, and the least effect on Geography and History.

The second tier of factors, namely the MOI arrangements in senior forms, takes account of sampled students' HKCEE results in subjects, which offer bilingual versions of papers for candidates. Senior-form MOI switching has the most significant effect on HKCEE results in Economics, Geography, History and Biology. It is revealed that CMI students who have remained in CMI mode (CMIC) have consistently shown significant and positive value-added advantages over EMI students. However, CMI students who switched to EMI mode (CMIE) in senior forms have lost the value-added advantages over EMI students, that they accumulated in junior-forms. Furthermore, means comparisons among valued-added measures of different strata revealed that CMIC students have consistent and significant value-added effects over CMIE students across different ability strata. For Physics and Chemistry, significant

and positive value-added effects are only found in CLOWC students. Finally, senior-form MOI arrangements have no significant effects on Mathematics, Additional Mathematics and Principles of Accounts.

The third tier of factors accounting for the differential outcomes of EMI and CMI students is individual learning habitus. It is revealed that students' *Self-Concept*, *Learning Motive and Strategy*, *Attitude towards Bilingualism and English Learning*, *Readiness to Use English*, and *Educational Aspiration* have all had some significant effects on HKCEE results. Most of these effects are only significant at individual level rather than school level. In short, the findings indicate that the positive constituents of individual learning habitus comprise holding high *Self-Concept*, having strong *Achieving Motive* in competing with and beating other students, adopting *Control Strategy*, having the attitude of *Effort and Perseverance*, *Control Expectations*, *Instrumental Motivation*, and holding high *Long-term* and *Next-year Educational Aspiration*. The positive constituents which lead to high HKCEE results in English (Syllabus B) consist of having high *English Self-Concept*, high *Interest in English*, a positive *Attitude towards Bilingualism*, and high *Readiness to Use English with Foreigners*, *with Mass Media*, and *in Class*. Negative components of individual learning habitus include adopting *Surface Strategy* and *Memorization Strategy*. It is also revealed that having strong feeling of *Difficulties in Learning English* is a negative component leading to low HKCEE results in English (Syllabus B).

The fourth tier of factors under study is school learning environment. It has produced some significant effects on the HKCEE results. Firstly, for students' perceived quality of school life at individual level, both the *Sense of Linguistic Efficacy* and *Perceived Opportunity Relating to the MOI in Use in Schools* have significant and positive effects on students' HKCEE results. At school level, *Sense of Linguistic Efficacy* has consistently produced significant and positive effects on Biology, Geography and History, and significant but negative effects on English (Syllabus B) HKCEE results. This is consistent with the findings that CMI students, who have higher *Sense of Linguistic Efficacy* than EMI students, have value-added advantages over EMI students in Biology, Geography and History, but negative value-added effects in English (Syllabus B) HKCEE results. The *Perceived Opportunity* at school level also has consistent, significant and positive effect on HKCEE results in English (Syllabus B), indicating that senior-form students who perceived greater opportunities in their prospects would have better results in this subject. Secondly, educational environment and culture of schools has some significant effects on HKCEE results at school level. Teachers' sense of *Depersonalization*, striving for *Personal Accomplishment*, their positive perceptions

on *Student Composition*, their positive perception on the *Effects of MOI Efficacy on Teaching and Learning* at senior forms, and their high sense of *Commitment to School* have some significant and positive effects on HKCEE results in some subjects. In addition, the use of *Student Assessment Information* by school has significant and positive effects on HKCEE results in science subjects.

The fifth tier of factors, socio-cultural learning environment, has also produced some significant effects on the HKCEE results. Parental *Supervision* at individual level has consistently produced significant and negative effects in most subjects. Furthermore, parents' *Participation* in regular school function at individual level has produced significant and positive effects, whilst conversely, parents' voluntary work in school routines has produced significant and negative effects, showing that these two types of parental participation in school activities each had an opposite effect on students' academic achievements.

The last tier of factors, classroom learning environment, has been illuminated by data from the qualitative study. Both productive and unproductive classroom discourses were observed in content-subject lessons in all MOI streams. Use of Cantonese by teachers prevails in many CMI-E lessons in CMI schools. As for English lessons, the English proficiency of teachers is important in creating a linguistically rich environment. Both proficient and non-proficient English teachers were observed in EMI and CMI schools. Authentic communication in English and persistent use of English are observed more often in English lessons in EMI schools, possibly because EMI students are relatively more proficient in English. Data also reveal that CMI lessons have more factors which are favorable for teaching and learning than EMI lessons.

4. Interpretations and Implications

To have a full understanding of how the effects of the implementation of the *Guidance* play out throughout the secondary years, the findings of the Senior-Form Study have to be interpreted in conjunction with the findings of the Junior-Form Study. The main ideas of the conclusion of the Junior-Form Study are recapitulated as follows.

4.1 Recapitulations

Firstly, as revealed in the Junior-Form Study, there is an instructional paradox at work in HK secondary school classrooms, which have institutionally been streamed into EMI and CMI modes. The paradox means that for CMI students, their learning in science and social studies has greatly been enhanced by CMI, while their learning in English has relatively been hindered by limited opportunities and confined situations

of English acquisition. In the case of EMI students, learning in science and social studies has been hindered by EMI, while their learning in English has greatly been improved by more opportunities and exposure to relevant (task-based) situations in English learning.

Secondly, a psychological paradox was found permeating among sampled students who had been streamed into EMI and CMI schools on entry into secondary education. CMI students enjoyed linguistic efficacy in learning situations at both classroom and school levels as indicated by both quantitative and qualitative data gathered. However, this linguistic efficacy was gained at the expense of another set of psychological dispositions. More specifically, CMI students tend to have lower self-esteem regarding their English proficiency, show less interest and lower motivation in English learning, express feelings of difficulty, fear or even an abhorrence towards English, perceive less opportunity in their educational and socioeconomic advancements, and last but not least hold ambivalent if not negative identifications with the MOI stream that they are in. In contrast, EMI students have consistently indicated their feeling of linguistic inefficacy in learning at both classroom and school levels throughout the junior-form years, and simultaneously expressed their relatively higher self-esteem from their English proficiency right at the beginning of the junior-secondary study (i.e. the first term of Form 1) and throughout the junior-secondary years. Furthermore, they are more likely to indicate greater interests and motivation in English learning, perceive brighter prospects for their educational and socioeconomic advancements, and positively identify with the MOI stream they are in.

Third, along with these instructional and psychological paradoxes, an institutional paradox of ability segregation has also been revealed in the Junior-Form Study. According to the policy design of the *Guidance*, in order to align students' levels of language proficiency with their designated MOI modes in secondary education and to eliminate the mixed-code situations existent in most of the so-called EMI schools before 1998/99, only the top 40% percent of primary-school leavers, who are proficient in both English and Chinese languages, are deemed to be EMI-capable. In addition, secondary schools, which have consecutively had more than 85% EMI-capable students in their Form-1 intakes for three years, are qualified to use EMI in most of their classroom instructions. Nevertheless, one of the consequences of aligning MOI modes with students' language proficiency is that it has further intensified the already high segregation and competition in the secondary-school system. As evidenced in the Junior-Form Study, the ability-segregation indexes of HK secondary schools have increased by about 10 % since the implementation of the mandatory MOI streaming policy in 1998/99.

Furthermore, students' pre-entry attributes, such as AAI, gender and SES, have become the most prominent and significant factors accounting for students' outcomes in both academic and psychosocial developments in their junior-secondary years. Among these pre-entry attributes, students' AAI at individual and school levels have proven to be the most significant attributes. Setting this institutional paradox of ability-segregation against the instructional and psychological paradoxes signified above, it can be concluded that the ability-segregation effect shaped at the entry point of the secondary-school system has worked its way into the instructional and psychosocial effects of MOI streaming on HK junior-form students.

4.2. Interpretations

With reference to the three paradoxes revealed in junior forms of the HK secondary-school system, findings of the Senior-Form Study have indicated that there are complications of these paradoxes as well as emergences of new paradoxes in senior form years.

First, a new paradox was encountered by CMI school administrations in senior-secondary schooling. The paradox manifested itself in the CMI schools' decision regarding switching senior-form students to EMI mode for the HKCEE. As revealed in the Senior-Form Study, CMI school authorities have switched a considerable number of senior-form students to EMI modes. These switching are based on students' academic abilities as well as the linguistic demands of the HKCEE subjects. More specifically, CMI students with higher academic achievement in junior forms were more likely to be switched to EMI mode. Furthermore, switching to EMI mode was more likely to take place in mathematics and science subjects than in social subjects in HKCEE. School administrators' primary justification for their decisions is that it is their responsibility to prepare students who have the potential to advance to higher education and the degree programs in local universities, most of which require students to be able to learn in English. However, one of the drawbacks of these decisions is that the value-added advantages in science and social studies, which CMI students accumulated in junior years over EMI students, have practically disappeared in HKCEE, which are examined in English-version papers. More specifically, students in CHIGE and CMIDE strata have practically no significant value-added advantages over EMI students in any science and social subjects at HKCEE. Therefore, it is a paradox facing CMI school administrators that when they try to decide on the MOI arrangement in senior forms, they are confronted by the conflicting needs of accommodating both students' long-term educational prospects of advancing to higher education and their immediate achievement in public examinations.

This paradox within the MOI arrangement in senior forms at school level have

complicated or even intensified the instructional, psychological and institutional paradoxes found in junior forms. For the paradox on the instructional effectiveness on English language and science and social subjects between EMI and CMI, the paradoxical situations have greatly been complicated as students are further differentiated into paper or syllabus options in HKCEE. As for most content subjects in HKCEE, there are English or Chinese versions of examination paper. As for English language in HKCEE, students can opt for either Syllabus A or B, between which Syllabus B has been considered to be more demanding.

As for science subjects, the choices between English or Chinese versions of HKCEE examination papers in Physics, Chemistry and Biology have complicated the instructional situation in CMI schools as revealed in findings of the Senior-Form Study. The findings indicated that CMI schools, especially CHIG and CMID schools, have switched a considerable proportion of their senior-form students to EMI mode. In Physics and Chemistry, CMI students' value-added advantages over EMI students in junior-form science achievement have disappeared in the HKCEE results. More specifically, there are no statistically significant and consistent positive value-added effects found among CHIGE, CHIGC, CMIDE and CMIDC students in the HKCEE results in Physics and Chemistry. Only CLOW students, the majority of whom have remained in CMI mode, have been able to retain their significant and consistent value-added advantages over EMI students of equivalent pre-entry attributes. As for Biology, all CMI students who have remained in CMI mode, i.e. CHIGC, CMIDC and CLOWC, maintained their value-added advantages over EMI students, while CHIGE and CMIDE students display no significant value-added advantages over EMI students. These findings signify that as CMI schools switched CMI students to English-version papers in science subjects in HKCEE, those students' accumulated value-added advantages in junior forms, over EMI schools, have diminished. These findings have confirmed the paradox facing CMI school administrations that preparing students for long-term prospects of advancing to higher education by immersing them into EMI mode would probably cause students immediate setbacks in achievements in HKCEE results.

As for social subjects such as Economics, Geography and History in HKCEE, which are relatively more literately demanding than science subjects, the findings of the Senior-Form Study have also confirmed that switching to English-version papers in HKCEE has turned out to be costly and difficult. First of all, CMI schools are more cautious in switching students to English-version papers in social subjects in HKCEE. This can be evidenced by the relatively smaller proportion of students who have opted for English-version papers in these subjects. The findings revealed that CMI students who remained in CMI mode in senior forms have significant value-added advantages

over EMI students in all three social subjects at HKCEE. However, HKCEE results for CMI students, mostly CHIG students, who opted for English-version papers in these three subjects, showed they had lost their value-added advantages, found in junior-form social studies, over EMI students in HKCEE results. These findings on social subjects have once again confirmed the paradox facing CMI school administrations that preparing students for long-term prospects of advancing to higher education by immersing them into EMI mode would be at the expenses of their immediate achievements in HKCEE results.

As for English language in HKCEE, sampled students' choices between Syllabuses A and B are unevenly distributed among the four sampling strata of the Study. Most EMI students have opted for Syllabus B. As for CMI students, numbers of students opting for Syllabus B decrease from CHIG, CMID to CLOW strata. Apparently, CMI students' choice of whether or not to sit for Syllabus B is decided by academic ability. As a result, the consistent and significant value-added advantages of EMI students over CMI students across all three ability strata found in junior forms have been blurred in the findings of the Senior-Form Study. As revealed in the findings from the HKCEE results in English (Syllabus B), EMI students' value-added advantages over CHIG and CMID students are still statistically significant, yet the magnitudes of the value-added advantages over CMID have been reduced, while EMI students' value-added advantages over CLOW students have become statistically insignificant. These changes in value-added effects on English achievement between EMI and different ability strata in CMI schools are probably due to the selection effect rather than learning effects among CMI students, especially those in CLOW strata. Nevertheless, the existence of the option for CMI students to choose between Syllabuses A and B have in fact complicated the instructional and psychological paradoxes in English learning, which have been confirmed in findings of both the Junior-Form and Senior-Form Studies. As evidenced in the findings of the Junior-Form Study, there is more or less a self-fulfilling prophecy at work between CMI students' psychological orientations towards English learning and their actual achievement in English. They have relatively lower self-esteem regarding their English competence, and lower motivation and interest in English learning. It is further revealed in the Senior-Form Study that students have stronger sense of difficulties of English learning and are less ready to use English in daily-life situations. As expected, their achievements in English were found to be relatively lower than EMI students. Therefore, a paradox has emerged confronting teachers and administrators in CMI schools in deciding to make the option of Syllabus A available to CMI students or even encourage them to opt for it. Is the decision an easy way out for CMI students or is it a responsible decision of finding a relevant syllabus to match

students' proficiency level? Should teachers in CMI schools work hard to overcome CMI students' self-defeating psychology towards English learning as well as the limited English learning environment in their schools or should they simply accept the situation and accommodate it?

In addition to the psychological paradox found in the psychological conditioning of some CMI students towards English learning, there is another one in CMI students apparent in their sense of linguistic efficacy in learning and their educational aspiration. It is revealed that CMI students, who have been switched to EMI in senior forms, have indicated that they have lost the strong sense of linguistic efficacy in learning they had in junior forms. However, in comparison to their fellow students in CMI schools, their educational aspiration has grown relatively higher. An opposite paradox can be seen among CMI students, who have remained in CMI mode. These findings have shown that the paradox found in junior form CMI students' psychological condition have grown and become more complex in their senior form education. In junior forms, the differentials in the paradox between linguistic efficacy and perception of prospects in educational advancements were mainly found between CMI and EMI students. Nevertheless, as CMI students were streamed into CMI and EMI modes in senior forms, the differentials in the paradox have worked their ways into the students in CMI schools.

Finally, findings in the Junior-Form Study have revealed that there is an institutional paradox of ability segregation at work right at the entry of secondary-school system. It was revealed that the alignment of students' language proficiency with their MOI in secondary schools have intensified the already high segregation and competition in the secondary-school system at the entry level. This institutional paradox has manifested itself at the exit point of the secondary-school system in a much more complicated form. On the one hand, it is the institutional reality existing in the context of local higher education, that in most of the local degree programs, not to mention those overseas, require their students to be able to learn in English. On the other hand, as secondary students progressed to senior forms and approached the first large-scale exit point of secondary-school system, i.e. HKCEE, in which only 30 per cent of the student cohort will be selected into the formal Form-Six programs and subsequently to the university entrance examination, HKAL Examination, the degree of ability segregation and competition intensified in the senior forms of HK secondary-school system. This can be evidenced in the findings that ability segregations begin to appear among CMI schools in the form of selecting relative high-achievers in schools to take English-version papers in content subjects and/or Syllabus B in English Language in HKCEE. As interpreted above, these ability segregations in turn have instructional and psychological effects on

senior-form students in CMI schools.

4.3. Implications

With regards to the above findings, we have set out four possible implications, which, we believe, may help HK educators to resolve or at least accommodate all the paradoxes at work within the policy context of MOI in the secondary-school system in the HKSAR.

(a) Instructional Implications

In the science classroom, both phases of the Study have indicated that learning science in English can have significant and negative value-added effects in comparison with learning science in mother tongue. It has been shown that EMI students experienced a double second-language (L2) effect in their learning of science in junior forms. The negative effect remained in the HKCEE result in Biology, but diminished in Physics and Chemistry. It implies that EMI students may have overcome the double L2 effects in the learning of Physics and Chemistry, which have relatively less literate demands at HKCEE, while the double L2 effect on Biology learning still remained after five years of immersion into English. We therefore advise that science teachers, especially Biology teachers, be sensitive to the double L2 difficulties imposed upon their students in the learning of science, which can be viewed as three aspects. They are (1) difficulties derived from the subject matter of science itself, more specifically its concepts and its logic of inquiry and thinking; (2) linguistic difficulties derived from understanding the teachers' expositions in classroom instruction, and (3) literate difficulties stemming from comprehensions of contents of examination papers.

CMI students, who have been switched to EMI mode in senior forms in science subjects, have experienced the similar double L2 effects as EMI students did but in much compressed and intensified ways. These CMI students not only experienced the same three learning difficulties which EMI students experienced in junior forms, but also had to overcome them in a much shorter time span. Additionally, in terms of coverage of subject matters, the syllabuses at HKCEE are much more intense in depth and wider in scope by comparison with the syllabus in junior-form integrated science. As a result, they have lost the value-added advantages over EMI students in science achievement, which they had accumulated in junior forms, in all three science subjects in the HKCEE. Furthermore, they have had significant negative value-added effects relative to CMI students who sat for Chinese-version paper in all three ability strata in the HKCEE results in Biology. Together, the implication is that science teachers preparing CMI students to sit for English-version paper in science subjects,

especially Biology, in HKCEE are confronted with a formidable task. Nevertheless, it is evidenced that CMI students' value-adding learning experiences in integrated science in junior forms are proven to have positive effects in helping teachers and students in overcoming these difficulties.

CMI students who remained in CMI mode in senior forms in science subjects, have not had to experience the learning difficulties encountered by their fellow students who switched to EMI mode. This is especially evident among CLOW students, who have enjoyed significant and consistent value-added advantages over EMI, CHIGE and CMIDE students of equivalent intake attributes in the HKCEE results in all three science subjects covered by this study. Nevertheless, teachers preparing CMI students for Chinese-version paper in science subjects in HKCEE should pay particular attention to the psychological paradox experienced by their students. That is, they may have enjoyed the linguistic efficacy in classroom instruction, yet a substantial proportion of them, especially among CMID and CLOW students, display educational aspirations which are relatively lower than their fellow students. Moreover, as illustrated in classroom observations, senior-form teachers in CMI classrooms have forgone some of the modes of instruction, such as classroom discussions, high-order-thinking dialogues between teachers and students, and activity approach, which are instructionally productive and fruitful in CMI, and have utilized direct-exposition modes for public-examination contents most of the time. This implies that CMI teachers may not have fully explored the instructional advantages of CMI as they submitted to the pressures for public-examination drilling.

When compared with classroom instruction for science subjects, the value-added advantages of CMI over EMI mode in social subjects, namely Economics, Geography and History, are more apparent. This is evidenced by the fact that CMI students sitting Chinese-version papers in the HKCEE had not only significant value-added advantages at individual level over EMI students in the results in all three subjects in the study, but also value-added advantages at group level over CMI students who had opted for English-version papers in the HKCEE. It is therefore advisable that teachers preparing students for English-version papers in social subjects in the HKCEE should be aware of the learning difficulties encountered by their students, especially CHIGE and CMIDE students. As indicated by the findings of the Junior-Form Study, these difficulties are more likely to be caused by the literate difficulties in understanding the examination questions and the expression of ideas in answering question and less likely to be caused by an inability to comprehend the concepts and theories of the subject matter. Hence, apart from developing students' conceptual and logical reasoning of the social subject concerned, teachers preparing students for English-version paper should pay particular attention to developing students' literate

competence in reading and writing for these social subjects in the HKCEE.

To prepare students to sit for Chinese-version papers in HKCEE social subjects,, both students and teachers do not have to face the literate difficulties presented by instructional texts. In principle, teachers can make use of the mother-tongue advantages and elevate the instructions to higher order thinking levels. However, as illustrated by classroom observations, senior-form teachers have the tendency to conduct their instructions in direct-exposition mode and have not made full use of the linguistic advantages offered by CMI mode.

As for English instruction, findings of the Study have confirmed that students in EMI schools basically have significant value-added advantages over students in CMI schools. However, the findings of the Senior-Form Study are not as consistent as those in junior forms because sampled students have been differentiated into Syllabuses A and B in HKCEE English Language. As a result, CMI students who opt for Syllabus A cannot be compared with either EMI or CMI students who sat for Syllabus B English because of the lack of a convergence base for comparison. Nevertheless, the findings do imply that CMI students are disadvantaged in English learning relative to their fellow students in EMI schools. Their opportunities for exposure to English comprehensible input are much more limited than EMI students. Apart from the deprivation of opportunities for English exposure, both phases of the Study have indicated that there is more or less a self-fulfilling prophecy at work between CMI students' self-defeating psychology towards English learning and their actual English achievements. Taking these facts together, English teachers in CMI schools are facing a formidable task. That is, they not only have to find ways to expose their students to more English-learning opportunities, in which authentic learning of English could occur, but also have to find ways to help CMI students to overcome their self-defeating psychological dispositions towards English learning. More specifically, CMI teachers have to find ways to resolve CMI students' psychology of low self-esteem with regard to their English proficiency, their low motivation and interest in English learning, their reluctance to use English in daily life, and their sense of difficulty of English learning.

(b) Psychological Implications

Regarding the self-defeating psychology prevalent among CMI students toward English learning, the two phases of the Study have also generated other implications for understanding the differentials in the psychological dispositions between students in CMI and EMI schools.

Findings of the Study imply that students in EMI schools have developed a particular kind of psychological configuration. They have developed higher English

self-concept right from the first term of Form 1 and this relatively higher self-esteem has been maintained throughout their secondary years. They have also consistently indicated relatively greater interest in and higher motivation for English learning. They have expressed relatively greater readiness to use English in daily-life situations. They are less likely to express sense of difficulties in English learning. They hold relatively higher educational aspirations. They even perceive themselves as having brighter prospects for educational and socioeconomic advancement. They are much more likely to identify with the MOI stream they are in, namely EMI. Together, these psychological attributes imply that there is a kind of English-dominant bilingual elitism permeating HK students who have been assigned to EMI schools. In contrast, a reverse psychological configuration can be found among CMI students across all three ability strata.

In recent policy discourse on MOI for secondary schools, the labeling effects between within-school and bifurcation approaches of MOI streaming at school-structural level have been deliberated at length. (EC, 2005) Nevertheless, the findings of the Study on the differentials in psychological configurations between EMI and CMI students may be taken as empirical evidence of the nature as well as features of the labeling effects on students' psychological well being. They should now be taken as an essential reference by all parties concerned in formulating MOI policy for secondary schools at both school and systemic levels.

(c) Implications for MOI Policy at School Level

It is evident from the findings of the Senior-Form Study that formulations of MOI policy for senior forms at school level are hard decisions for all parties concerned in CMI schools. The structure of the decision is multi-level, multi-lateral and multi-dimensional in nature. First, it involves two interrelated levels of study, namely, Form 4-5 and Form 6-7. Second, it concerns various school subjects. Third, it pertains to two sets of alternatives. One is the choice between Syllabus A and B in English Language in HKCEE. The other is the alternative between Chinese- and English-version papers in various content-subjects in HKCEE as well as HKALE. Finally, all these choices have to be made with reference to students' academic ability, their long-term prospects and their immediately relevant examination results in two vital public examinations, namely, HKCEE and HKALE. Furthermore, findings of the Senior-Form Study have revealed that consequences of these decisions have a number of paradoxical implications.

First, the decision of switching the high-achievers in CMI schools to EMI mode in senior form may be responsible decision of immersing students to their potentially designated learning environment in university, the MOI of which is predominantly English. However, it may be at the cost, for these high-achievers in CMI schools, of

significant reduction in their HKCEE results in History, Geography, Economics, Biology, and to a lesser extent, Physics and Chemistry. Second, the decision of allowing or even encouraging CMI students to opt for the less demanding Syllabus A in HKCEE English language, may be the sensible decision of matching students' competence with the suitable syllabus. However, such a decision may reduce students' potentials and encourage the self-defeating psychology towards English learning so commonly found among CMI students in HK.

It must be emphasized that we are in no way, nor in any position to pass judgment on the merits of either side of these paradoxes. All we must say is that these implicated paradoxes can serve as points of reference for school authorities when making those hard and vital decisions on MOI arrangements affecting their senior-form students' futures.

(d) Implications for MOI Policy at Systemic Level

As shown by the findings of the two phases of the Study, the policy measures of the *Guidance* have induced numbers of changes in the MOI policy environment of the HK secondary-school system, which may carry essential implications for the formulation and review of MOI policy at systemic level.

First, the findings of the Junior-Form Study revealed that the *Guidance*, which is designed to align students' language proficiency with their designated MOI mode in secondary education, has intensified the ability segregation already existent in the HK secondary-school system. This is indicated, in the findings of the Junior-Form Study, by the ability-segregation index of the HK secondary-school system at Form-1 level (measured by the percentage of between-school variance of AAI in HK secondary schools), which has risen by about 10%, i.e. from about 70% before, to 80% after the implementation of the *Guidance*. It has also been revealed that these between-school ability segregations have significant effects on academic and psychosocial development of junior-form secondary students.

Second, the findings of the Senior-Form Study revealed that the degrees of competition and segregation within the HK secondary-school system have been increased as students approach their first exit-point of their secondary education, namely HKCEE. This is evidenced in the findings that as CMI students started to prepare for the HKCEE, they underwent further differentiation if not segregation into various options between English- and Chinese-version papers in most content subjects in the HKCEE and between Syllabuses A and B in HKCEE English language. It has also been evidenced that these ability-differentiations in senior forms have not only further intensified the ability segregation found in the Junior-Form Study but also produced some significant effects on academic and psychosocial development of

senior-form students.

Altogether, these findings imply that the implementation of the *Guidance* has induced policy consequences which exacerbate the degrees of competition and segregation within the HK secondary-school system, and in turn have exerted significant effects on students' academic and psychosocial development. We believe that policy-makers should make particular reference to these implications in formulating the MOI policy for the HKSAR secondary-school system.

4.4 *Limitations and Future Research Prospects*

These implications of the findings of the Study are by no means exhaustive or conclusive. They cannot be interpreted as definite prescriptions which might lead us out of the various paradoxical situations outlined above when engineering MOI policy in HK secondary schools. They should rather be construed as suggestions or references to facilitate the policy discourses and debate relating to the issue and the design of professional practices for parties concerned in the MOI-policy context of the HKSAR secondary-school system. These words of caution are mainly prompted by the following limitations of the Study.

First, the Study is by design a survey study and not experimental or developmental in nature. It is to capture the attributes of the phenomena under study in natural settings and no manipulations of or interventions in the phenomena have ever been undertaken. Furthermore, this Study is by definition an *ex post facto* evaluation research on the implementation of an education policy, namely the *Guidance of Medium of Instruction for Secondary Schools*. Hence, the data collected and analyzed are records of events having taken place in temporal sequence. Therefore, it is necessary to point out that these data could not have captured the total educational activities undertaken in the sampled schools, which were affected by the policy measures entailed by the *Guidance*. The implications should be taken as information which may help all parties involved in the MOI policy discourse to sensitize their level of awareness and enrich their conceptual understanding of the issue.

Secondly, this five-year longitudinal study has only traced the sampled students' academic and psychosocial developments in their secondary years. It no way tells whether the effects of CMI or EMI on their developments revealed so far will be sustained, increase, or decrease in the longer term. Therefore, one prospect for further study on the issue is to track these students further on their educational and socioeconomic attainment paths and to see the MOI effect over a longer time.

Thirdly, this five-year longitudinal study, which began in the second year of the implementation of the *Guidance* (i.e. 1999/00), can only assess the effects of the

policy measures in their initial stage. Usually, it takes time for policy measures, especially education policy measures, to mature and consolidate. For example, it takes time for school administrations, teachers, curriculum leaders, textbook publishers, and other parties concerned to adjust to the policy changes and to come up with effective professional practices to cope with the new situations. Hence, the effects of EMI and CMI revealed here may be augmented as the policy measures initiated by the *Guidance* are consolidated in school environments and/or established as common professional practices in classroom situations. These propositions on the differential effects of any developmental stage of policy measures have pointed to yet another prospect for the further study of the MOI issue in the HKSAR.

Apart from these three empirical limitations, there is another limitation derived from the epistemological foundation of the Study. It has been documented in literature on language policy and planning that research on language policy in education is a formidable endeavor, especially if researchers adopt not only the individualistic and neo-classical approaches but also the historical and structural perspectives. The difficulties are espoused not only from the complexities of the empirical properties under study, but also from the complications of the cultural, socioeconomic, and political contexts in which the issues under investigation are embedded. In relation to this limitation, we would like to underline that the findings and implications of the Study should not be taken as a once-and-for-all conclusion to the MOI issue of the HKSAR. Instead we would recommend that the findings of the Study should be taken as empirical references to facilitate a rational and democratic discourse on MOI policy in secondary schools in the post-1997 HKSAR.