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Contents

Special Issue: Quality Education for All: Family Literacy and Self-Regulated Learning

Editorial Board

Quality Education for All: Family Literacy and Self-Regulated Learning

Never before has education been given the kind of emphasis -- unanimously and explicitly -- by policymakers, educators and parents around the globe as it has in the twenty-first century. The emphasis is not only on the provision of Education for All (EFA, Dakar World Education Forum) (UNESCO, 2000), but in parallel, strong expectations on the endowment of quality education for all as a fundamental human right (Pigozzi, 2006). Within a rights-based framework, two levels of quality education are promoted, the first of which is at the level of the learner and the second, the learning system. At the level of the individual learner, his or her background and previous knowledge have to be recognised to ensure equity, inclusion, and optimal learning potential of each learner. Further, a safe and supportive environment conducive to learning has to be provided. At the system level, quality education necessitates an infrastructure for effective operation including the enactment of legislation, policy implementation, resource distribution, and quality assurance to ensure sustainable improvement (Pigozzi, 2006). This two-level quality education framework constituted the point-of-departure of the current Special Issue.

India is an important and interesting system to consider for the implementation of the EFA ideal put forward at the Dakar World Education Forum (UNESCO, 2000). It is one of the most populous and diverse democracies in the world, with a population of over 1.2 billion (Government of India, 2011), 35 states and union territories each with one or more official languages, and is the tenth largest economy by nominal GDP. The sheer scale of the diversity in languages, urban/rural divide, socio-economic home background, and the rich/poor divide in terms of the availability of physical and cultural resources that children bring with them to school meant that education reform in India posed a real challenge. Yet, in 2010, India became one of 135 countries to commit to EFA through the Right to Education Act of the Parliament of India. This is heartening for all educators. Indeed, a supportive legislative framework, along with managerial and administrative systems, implementation of good policies, and means to measure learning outcomes, is one of the five system-level dimensions of quality education (Baxter & Bethke, 2009, p. 41).

Against this backdrop of education in India, Sengupta and Mukherjee (2014) explicated in their study the causal relationship between various socio-economic variables of the family and the family literacy rate. Using a Tobit regression model on large-scale national data, Sengupta and Mukherjee (2014) identified supporting empirical evidence that the level of family literacy was directly impacted by family economic variables, including family assets and family income. Given the importance of literacy level for a system, as clearly articulated by the UK Department for International Development (DfID, 2000, p. 1), "the elimination of poverty and progress towards sustainable development will only take place if there are increased and improved levels of education," Sengupta and Mukherjee's (2014) study represents a significant contribution to the promotion of quality education.

At the learner level, five dimensions of quality education were proposed by UNESCO (2004; see also Baxter & Bethke, 2009, p. 38; Pigozzi, 2006), namely, seek out the learners, respond to what the learner brings, content (what is learned), processes (of learning), and learning environment. In particular, the learning processes include a variety of learner-centred instructional approaches, whereby active initiation and engagement of the learners are encouraged. Three articles in this Special Issue by Ho (2014), Lau (2014), and Mok and Zhu (2014) were devoted to the topic of self-regulated learning in the context of Hong Kong education.

Self-regulated learning has attracted much research attention over the last three decades, and a number of theories about its processes and its impact on academic learning have been developed (Bjork, Dunlosky, & Kornell, 2013). Nevertheless, as highlighted by Lau (2014), self-regulated learning is a concept introduced from Western countries and how it can be implemented in Asian classrooms -- which are well-documented as characterised by teacher-centred, authoritative, instructional approaches (Lau, 2014) -- needs further exploration. Thus far, research into the implementation of self-regulated learning in the Asia-Pacific Region is comparatively sparse. This Special Issue brought together three pieces of research undertaken in Hong Kong with the aim of investigating implementation strategies and pedagogical models of self-regulated learning at the school (Ho, 2014), classroom (Lau, 2014), and individual (Mok & Zhu, 2014) levels. Ho (2013) summarised succinctly, "the most effective way to improve the quality of learning is to open the black box of classroom learning and have real changes in pedagogy to facilitate student learning." This is what the Special Issue tried to achieve.

Hong Kong is a densely populated Special Administrative Region geographically situated at the southern part of China. The government has provided free and compulsory education for six years for all children after the child reaches the age of six since 1978. A strong societal value is placed on education. Nevertheless, education in Hong Kong has been described as

teacher-centred, examination-oriented, highly competitive, and characterized by rote-based learning (Lau, 2014). Numerous reforms have been introduced to Hong Kong education since 2000, but as Lau (2014) and Ho (2014) independently pointed out, many of these initiatives did not seem to have major impacts on improving the quality of student learning.

Ho (2014) in this Special Issue explained how he transferred strategies learned from Shandong, China, and adapted them in the school context of Hong Kong. Using his own school as a basis for action research, Ho (2014) developed an innovative model which provided a holistic framework of self-directed learning comprising four learning sessions, namely, self-learning, co-learning, mutual learning, and teacher-directed learning. Each of these sessions has its own characteristic learning activities and facilitating strategies, and each may take place at home or in school. Integrated in Ho's (2014) model are the essential self-regulation processes, including motivational regulation, behavioural regulation, cognitive regulation, and meta-cognitive regulation. Importantly, learning and teaching is no longer a one-way route as in traditional classrooms. Rather, learning can be in the form of self-directed learning by students individually, in small groups, with the whole class, or teacher-guided in class. The teacher, peers, as well as the individual student him- or herself are all resources to new knowledge. The four learning sessions complement one another, and jointly form a rich and holistic learning experience for the child. In the report, Ho (2014) analysed the design, implementation strategies, and self-evaluation mechanisms of a three-year school-based intervention plan. The study by Ho (2014) represents an important breakthrough in the implementation of self-regulated learning in locations dominated by a teacher-centred teaching culture.

An independent study by Lau (2014) focused on the possibilities and challenges of implementing self-regulated learning in Chinese language classes. While acknowledging certain antithetical elements between the heritage of Chinese Confucian culture and self-regulated learning, Lau (2014) capitalised on the characteristics of self-regulated learning identified in students of Chinese language classes, as well as Hong Kong teachers' willingness to use self-regulatory instruction based on their good will to enhance student learning. Lau (2014) reported the challenges and success stories of implementing self-regulated learning in Hong Kong Chinese language classes, based on a series of quantitative and qualitative studies, with the participants comprised of 31 teachers and 1,121 tenth grade students in Hong Kong.

Using a person-centred analytic approach, Mok and Zhu (2014) considered the implementation of self-regulated learning at the individual level. Their study focussed on the profiles of clusters of self-regulated learning students formed from a combination of attitudes (expectation and perceived usefulness) toward feedback from teachers and student mathematics achievement. Their study found, inter alia, different self-regulated learning practices of clusters of students with low, medium and high achievements. In line with the UNESCO (2004) framework of quality education at the learner level, Mok and Zhu's (2014) study highlighted the importance of responding to what the learner brings in the implementation of self-regulated learning instructions.

Quality education plays a critical role in the sustainable development of a society and individuals. Using a two-level conceptual framework of quality education (Pigozzi, 2006), this Special Issue contributes to the field by putting together four pieces of research on family literacy conducted in two Asia-Pacific educational systems at the system level (Sengupta & Mukherjee, 2014), and at the individual level on self-directed learning. For the latter, the possibilities and challenges of enactment at three frontline facets were explored, namely, school-based implementation (Ho, 2014), classroom implementation (Lau, 2014), and learner characteristics (Mok & Zhu, 2014). As Bjork et al. (2013, p. 438) wrote, "There is much to learn about learning;" the four studies included in this Special Issue afforded new viewpoints for future research endeavours in extending our knowledge-base for quality education in the Asia-Pacific Region and beyond.

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Cluster Analysis of Attitudes towards Feedback and Their Mathematics Achievement: A Study of Hong Kong Primary Students

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Abstract

This study aimed to identify clusters of primary students based on their mathematics achievement, and their perceived usefulness of and expectation of feedback from teachers, and second, to examine profiles of self-regulated learning of the students in these clusters. The sample consisted of 4,570 students at Primary 3 to Primary 5 in Hong Kong. Two-step cluster analysis identified three clusters of students in each year level, namely, low achievers with negative feedback attitudes, high achievers with moderately positive feedback attitudes, and moderate achievers with strong positive feedback attitudes. Further, the clusters of moderate and high achievers shared similar mathematics self-efficacy, but moderate achievers had higher achievement goals and stronger self-regulated learning practices than either high or low achievers. Further, low achievers had the lowest, and moderate achievers the highest, self-regulated learning in mathematics. These results were consistent across year levels.

Keywords: mathematics achievement, feedback usefulness, feedback expectation, self-regulated learning, primary student

1 Introduction

Feedback is conceptualized as an action taken by an agent, such as a teacher, a peer, a parent or the learner himself/herself, to provide information about a performed task in order to narrow the gap between the actual level and the targeted level of the performance (Kluger & DeNisi, 1996; Shute, 2008). Several recent reviews identified feedback as one of the most important factors contributing to student learning (Gabelica, Van den Bossche, Segers, & Gijselaers, 2012; Harks, Rakoczy, Hattie, Besser, & Klieme, 2014; Hattie, 2009; Parr & Timperley, 2010). Nevertheless, research has been equivocal with regard to whether the effect was positive or negative to the learning and the learner (Hattie & Timperley, 2007). Recent research showed that effects of feedback on learning could be moderated by individual students' attitudes toward feedback utility (Karakaş, 2011; Rakoczy, Harks, Klieme, Blum, & Hochweber, 2013; Yoshida, 2010), their understanding of feedback (Carless, 2006; Havnes, Smith, Dysthe, & Ludvigsen, 2012; Lee, 2008), their perceptions on the quality of feedback, the way feedback was delivered (Harks et al., 2014), and the students' level of subject knowledge (Fyfe, Rittle-Johnson, & DeCaro, 2012). In other words, the combination of the intrapersonal feedback attitudes and achievement level may affect students' action orientation toward feedback, and hence its effect on learning. As such, an alternative research strategy to the common variable-centred approach, is to use a person-centred approach in order to identify the groups of students with similar configurations of feedback attitude and achievement level. This constituted the first aim of the study.

Several researchers (Butler & Winne, 1995; du Toit, 2012; Labuhn, Zimmerman, & Hasselhorn, 2010; Nicol & MacFarlane-Dick, 2006; Robinson, Pope, & Holyoak, 2013; Zimmerman, 2000) highlighted the inseparable relations between feedback and self-regulated learning. Some of them (Nicol & MacFarlane-Dick, 2006; Robinson et al., 2013) even asserted that if feedback were to be effective, it should support students' self-regulated learning. Nevertheless, research into the combined effect of feedback and achievement on self-regulated learning, particularly for primary students, had been rare. The second aim of this study is to examine the self-regulated learning profiles of clusters formed in the first step of the study.

2 Situational Factors for the Effect of Feedback on Learning

2.1 Inconsistent Effects of Feedback on Learning

Feedback was described as a "double-edged sword" as it could have positive or negative effects on subsequent learning, depending on the process by which the feedback was given and received (Black & Wiliam, 1998; Hattie & Timperley, 2007). On the one hand, feedback was found to enhance students' motivation and confidence toward mathematics (Everingham et al., 2013), and increase the

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accuracy of self-evaluation regarding their own mathematics achievement (Labuhn et al., 2010). Further, at-risk students who tended to be overconfident benefited, albeit marginally, in performance from performance feedback (Labuhn et al., 2010). On the other hand, meta-analysis by Kluger and DeNisi (1996) showed that over 38% of the effects of feedback interventions were negative, although on average, feedback was found to have a moderately positive effect. A more recent review by Gabelica et al. (2012) found only half of the studies involving performance feedback showed positive effects while the remaining studies had no significant effect, although their research did not find any negative effects of feedback. Hattie and Timperley (2007) found conflicting results with regard to the effect of feedback on performance. Thus, feedback may be beneficial, have no effect, or even be debilitating to learning.

2.2 Attitudes toward Feedback as Moderators of Feedback Effects

A number of reasons might have accounted for inconsistencies in the effects of feedback across studies, including the quality of feedback, the process of feedback delivery, and the perception of the feedback by the receiver (Harks et al., 2014). In parallel with personnel research (e.g., Baker, Perreault, Reid, & Blanchard, 2013) which found feedback to be counterproductive and aroused negative perceptions in the receivers if managers overlooked smaller accomplishments of employees and focused only on deficiencies, in the context of schools, if the feedback was perceived negatively by students (Karakaş, 2011; Yoshida, 2010), or if students did not understand the meaning of the feedback from their teachers (Carless, 2006; Havnes et al., 2012), the feedback would be counterproductive. Several studies (Carless, 2006; Lee, 2008) highlighted the dissonance between teachers and students in their perceptions of the values, meanings, frequency, and utility of feedback. In particular, Carless's (2006) survey of 460 faculty staff and 1,740 students from eight universities in Hong Kong found teachers and students held rather different perspectives about the usefulness of feedback. Teachers perceived more quality and usefulness in the feedback they provided than their students did.

An individual's belief in feedback utility has been highlighted in the literature (Handley, Price, & Millar, 2011; Jonsson, 2013; London & Smither, 2002) as critical in determining the recipient's ultimate engagement with the feedback. In the field of management, London and Smither (2002) coined the term feedback orientation to describe "an individual's overall receptivity to feedback. (p. 81)" Feedback orientation included the perceived feedback efficacy, liking feedback, and feedback expectancy. In higher education, Jonsson (2013) identified students' attitudes toward feedback utility to be crucial to their use of feedback, but other factors, such as students' capacity for understanding the academic messages embedded in the feedback also affected feedback use. Research on the association between feedback orientation and achievement of primary students had been relatively sparse. With an aim to fill this research gap, primary students' perceived feedback efficacy and their expectations on feedback were used in this study as indicators for their feedback orientation, and clusters of students were formed based on students' feedback orientation and their mathematics achievement.

2.3 Prior Knowledge as Moderator of Feedback Effects

The extent to which a piece of feedback was used to improve learning depended on the student's capacity to understand the message contained in the feedback (Jonsson, 2003), and the student's prior knowledge played a part in that understanding. Fyfe et al. (2012) found, in experiments involving 115 Grade 2 and Grade 3 students, that effect of feedback on learning was moderated by students' prior knowledge. In their experiments, students were provided with no feedback, feedback on their answers, or feedback on domain-specific problem solving strategies during their exploratory problem solving. The results showed that feedback was beneficial to gains in procedural knowledge at a second stage of the study for students with low prior knowledge of strategies during exploratory problem solving, but students with some prior knowledge of strategies actually learned less with feedback than without feedback during exploration. In the current study, students' achievement in mathematics was taken as a proxy of their prior knowledge in mathematics.

3 Feedback and Self-Regulated Learning Processes

Ample research provided evidence in support of the beneficial effect of quality feedback on academic performance (Black & Wiliam, 1998; Butler & Winne, 1995; Hattie, 2009; Hattie & Timperley, 2007; Labuhn et al., 2010), and several theoretical models, including including Boekaerts' (1992) adaptable learning model, Borkowski's (1996) metacognition model, Winne and Hadwin's (1998) four-stage model, and Zimmerman's (2000) social cognitive model, were put forward to explain the mechanism through which this took place. In this study, our point of departure was the cyclical model of self-regulation explicated by Zimmerman (1989, 2000). Zimmerman (1989) defined self-regulated learning as self-directed processes through which the learner proactively

modulated his/her thoughts, feelings and activities during learning in order to attain the desired learning goal.

In Zimmerman's (1989) model, feedback from previous performance was conscientiously used by the learner to regulate behaviour in the current learning endeavour (hence cyclical). Three processes -- personal, behavioural, and environmental -- were depicted in the model to have reciprocal influences on each other, and feedback served as the connective among them (Zimmerman, 1989, p. 330).

In this study, self-efficacy in mathematics and goal orientation were included as personal process variables, and self-regulation as behavioural process variable. Cluster membership defined by the combination of students' previous mathematics achievement and feedback orientation was used as a proxy for environment process variable. Self-efficacy, or belief in one's own capacity to conduct organised actions for a task, is domain specific and context bound (Bandura, 1997). It has been highlighted as essential for self-regulated learning because of its effect on goal setting, committed effort, and perseverance of the learner (Zimmerman, 2000).

Self-regulation in the context of education refers to processes that learners change their learning behaviours in order to achieve their learning targets (Sitzmann & Ely, 2011). In this study, it referred to processes the learners used to "strategically regulate behaviour and the immediate learning environment (Zimmerman, 1989, p. 330)" on the evidence of feedback (e.g., "I modify my learning methods according to teachers' comments").

Goal orientation is students' beliefs about the purposes of learning and this construct is explicitly incorporated in Zimmerman's (2000) model. The notion of personal best goal orientation was proposed by Martin (2006, 2011) and referred to goal orientation with the purpose of going beyond one's own best learning performance achieved earlier. Four dimensions, namely, specific goals, challenging goals, self-referenced goals, and self-improvement goals, were the cornerstones for personal best goals (Martin, 2006). The current study focused on the dimensions of self-referenced (e.g., "I do not compare myself with others but just do my best") and self-improvement (e.g., "I keep striving for breakthroughs in my learning") goals, given governmental policy emphasis on self-initiated improvement and development both at the school- (Education Bureau, 2013) and student-levels (Education and Manpower Bureau, 2005) in Hong Kong where this study was conducted. The self-referenced orientation in personal best goals is in line with the distinguishing feature, the self-oriented feedback loop, proposed in Zimmerman's (1989) model.

Research by Martin and associates (Liem, Ginns, Martin, Stone, & Herrett, 2012; Martin, 2011) showed that by using one's previous best performance as benchmark, the learner was sheltered from comparisons against an absolute standard, or comparisons with other students, both could be too demanding for an individual learner; thus, personal best goals tended to be more meaningful and aligned with the individual learner's current status. Further, personal best goal serves as a constructive intermediary between the dichotomy between mastery- and performance-goal orientations by emphasizing on both self-improvement and comparison (Martin, 2006, 2011). Personal best goal orientation was used in this study for these reasons.

4 Person-Centered Approach to Studying Feedback and Achievement

4.1 Understanding Feedback from Students' Perspectives

Despite numerous studies on the effect of teacher feedback on student learning, most of these were from the teachers' perspectives rather than the students,' and few studies had explored the students' affective and cognitive responses toward feedback (Hargreaves, 2013; Havnes et al., 2012). One important exception was a study by Beaumont, O'Doherty and Shannon (2011) who used semi-structured focus group interviews of 37 undergraduate students and 13 university teachers from three disciplines across nine institutions. The study found that students considered quality feedback to be dialogic exchanges, which might be written or verbal exchanges, between the student and tutor for guidance and reassurance of the students' learning (p. 674). Based on the data, a model titled Dialogic Feedback Cycle was developed on processes of quality feedback, which comprised guidance in preparation for an assignment, in-task guidance given to support work on the assignment, and performance feedback after the submission and feed-forward for subsequent learning (Beaumont et al., 2011). Nicol (2010) also highlighted the importance of engaging students in dialogistic feedback for it to be effective to the students' learning in higher education. Similar studies at the primary school level were rare.

To date, little is known about how students engage with the information contained in the feedback and regulate their thinking or behaviour accordingly to enhance their learning. How feedback is taken up and used by the student for the improvement of strategies and efforts toward reaching the learning goal has been largely neglected by previous research. This research gap is unfortunate because feedback by itself would not automatically have any impact; until and unless the meaning of the given feedback is understood and acted upon by the receiver, it loses its function as feedback (Carless, 2006; Jonsson, 2013). Yet, individual students react differently to the same piece of feedback, depending on their background, discipline, own competency beliefs,

nature of student-teacher relationship, the context within which the feedback is given, the student's interpretation, emotional acceptance of the feedback, perceived usefulness of feedback, and the student's epistemological beliefs about feedback (Dennis, Masthoff, & Mellish, 2012; Hyland, 2013).

4.2 Intra-Personal Variables for Feedback Effect

The above review showed that responses to feedback were elicited by a combination of intrapersonal correlates of achievement (e.g., the student's belief about the utility of feedback; his/her expectations on feedback), inter-personal correlates of achievement (e.g., student-teacher relations), and contextual variables (e.g., context in which the feedback was given), rather than by the feedback itself. The same piece of feedback might provoke very different response from students because of the combination of these variables with feedback.

This study focussed attention on intrapersonal correlates of achievement and examined the association between feedback attitude and mathematics achievement from the perspective of students. Whereas previous studies typically used a variable-centred approach (e.g., by using regression or structural equation modelling) in investigating the relationship between feedback and achievement, this study adopted a person-centred, or in the context of this study, a student-centred approach, whereby clusters of students were formed using three indicators, namely, students' mathematics achievement, their attitudes toward feedback usefulness and their expectations for feedback. A person-centred (i.e., centred on students) approach was considered appropriate here because the same piece of feedback might elicit very different response from different students (Dennis et al., 2012; Hyland, 2013). The study then examined characteristics of the clusters and cluster profile on students' self-regulated learning six months later.

Specifically, two research questions were addressed:

1. Could students be identified in distinct clusters on the basis of their perceived feedback efficacy, expectations of teacher feedback, and mathematics achievement?
2. What was the profile of self-regulated learning in mathematics for students in the clusters?

5 Methods

The current study was part of a larger longitudinal study on feedback, self-directed learning and mathematics achievement of primary students in Hong Kong. The present study used data collected at the baseline, and focused attention on students' perceived usefulness of feedback from teachers, expectations of feedback from teachers, and students' mathematics achievement. Then clusters profiles on self-regulated learning six months later were examined.

5.1 Sample

All primary schools in Hong Kong were invited to take part in the project and 26 expressed an interest to voluntarily participate. The sample for the larger study comprised 4,687 students currently enrolled in 165 classes at Primary 3 (P3; median age 8 years), Primary 4 (P4; median age 9 years) and Primary 5 (P5; median age 10 years) from these 26 primary schools. Although not randomly selected, the schools were representative of all schools in Hong Kong in terms of geographic location (Hong Kong Island/Kowloon/New Territories North and East/New Territories West), gender of school population (co-education/single sex schools), religious background of school (with/without religious affiliation), and averaged achievement level (i.e., band 1/2/3 school). The sample for the current study comprised 4,570 students with complete data on the selected variables; 117 students were excluded because of missing data. There was no statistically significant difference between students with complete and incomplete data in their mathematics achievement at baseline. There were 2,414 (52.8%) female students and 2,156 (47.2%) male students in the sample. Table 1 presents the sample distribution by gender and year level.

5.2 Instruments

The instruments used in the present study included a self-report questionnaire and multiple choice academic achievement tests for students in different grades. The mathematics tests were developed according to the Hong Kong mathematics curriculum. The test for P3 contained 29 curriculum-based achievement items and the tests for P4 and P5 each contained 35 items.

In order to address research question 1, clusters of students were formed using cluster analysis on three latent variables comprising students' perceived effectiveness of teachers' feedback in support of their learning as measured by the Feedback Efficacy Scale, students' expectations of feedback from teachers as measured by the Feedback Expectation Scale, and students' mathematics competencies as measured by the mathematics test.

Table 1 Sample Distribution by Gender and Year Level

Year Level	Female	Male	Total
P3	741 (48.1%)	800 (51.9%)	1,541
P4	910 (58.3%)	651 (41.7%)	1,561
P5	763 (52.0%)	705 (48.0%)	1,468
All	2,414 (52.8%)	2,156 (47.2%)	4,570

Note: Within-year-level percentages are presented after the sample size and in parentheses.

The Feedback Efficacy Scale was designed to measure students' perceived usefulness of feedback from teachers. It was made up of four Likert-type items with four response options, namely, 'Useless,' 'Not Too Useful,' 'Quite Useful' and 'Very Useful.' The items had a common item stem stating, 'How useful are the following forms of feedback in supporting your learning?' An example item is 'Conversations on learning between teachers and me.' Psychometric properties of scales are discussed in later sections.

The Feedback Expectation Scale was also designed to measure students' expectation of teachers' feedback in support of their learning. It was made up of four Likert-type items with four response options, namely, 'Strongly Disagree,' 'Disagree,' 'Agree' and 'Strongly Agree.' The items had a common item stem stating, 'I hope to get the following forms of feedback from my teachers...' An example item is 'Point-out the specific mistakes (e.g., say "You forgot to simplify the fraction, so the answer is still wrong.").'

After forming the clusters using the students' responses to the two feedback attitude scales in conjunction with their mathematics achievements, profiles of self-regulated learning in mathematics of students in the clusters were explored in order to address research question 2.

The Personal Best Goal Orientation Scale was adapted from Martin's (2006, 2011) conception and measurement scale of personal best goals. It comprised seven Likert-type items. An example item was, 'My target is to achieve beyond my existing performance' and the response options were 'Strongly Disagree,' 'Disagree,' 'Agree' and 'Strongly Agree.'

The Self-Efficacy Scale was designed to measure students' self confidence in doing well in mathematics. A student's mathematics self-efficacy, or the student's self-beliefs about his/her own capability to learn and do well in mathematics, was found to be an important factor both contributed to and affected by the student's achievement in the subject, and the effect was mediated by the student's self-motivation about the subject (Labuhn et al., 2010; Ramdass & Zimmerman, 2008). The Self-Efficacy Scale comprised four Likert-type items. An example item was, 'I learn things quickly in mathematics' and the response options were 'Strongly disagree,' 'Disagree,' 'Agree' and 'Strongly agree.'

The Self-Regulation Scale was constructed to measure primary students' modulation on their learning approaches on the basis of feedback. It was made up of seven Likert-type items. An example item was, 'When I find that I am doing less well in my study, I change my learning methods,' and the response options were 'Strongly disagree,' 'Disagree,' 'Agree' and 'Strongly agree.'

5.3 Procedures

The students completed a self-report questionnaire during one class session of 40 minutes and the mathematics test in another class session under the teachers' supervision at school. Data collection for all schools was completed within two weeks. Response sheets of the questionnaires and of the mathematical tests were scanned with verification, and the data were captured electronically. About one-fifth of the questionnaire and mathematical test response sheets were randomly selected for cross-examination by another team of the scanning company to ensure that the data were correctly captured. All procedures of the study were approved by the Ethics Review Committee of the university where the authors worked, and ethical guidelines were strictly followed throughout the study.

Scale internal consistency in terms of Cronbach's alpha was reported for each scale. Using Winsteps® (version 3.81.0) (Linacre, 2014), Principal Components Analysis of Rasch residuals (Linacre, 2014; Raîche, 2005) was used to determine the unidimensionality of each scale. Psychometric properties of the scales were examined. Using the Rasch rating scale model (Wright & Masters, 1982), Rasch measurements of the latent variables were estimated for each student.

Next, the calibrated Rasch measurements of the students' latent trait of perceived effectiveness of teachers' feedback in support of their learning, expectations of feedback from teachers and mathematic achievement were used as three indicators in the subsequent Two-Step Cluster Analyses using SPSS (Version 21) in order to find the pattern of the latent trait among the students within each year level. The number of clusters was identified using the distance measure of log-likelihood, maximum branches (per leaf node) of six and maximum tree depth (levels) of six. The number of clusters was then determined on the basis of the clustering criterion of Akaike's Information Criterion (AIC), Schwarz's Bayesian Criterion (BIC), interpretability of the clusters, and pattern of clusters across year levels. For each year level, multivariate analysis of variance (MANOVA) was conducted to ascertain statistically significant difference between the cluster mean Rasch measures of the clusters. Last, profiles of self-regulated learning of the students in different clusters were presented.

It should be noted that although the same set of attitude scales were used across year levels, P3, P4 and P5 students completed different mathematics tests which were designed according to the respective curriculum. Thus, both the validation of the mathematics tests and the subsequent cluster analyses were conducted separately for each year level. Further, although multilevel analysis should have been used because of the nested nature of the data, preliminary analysis found only low intra-class correlations

(ranging from 0.006 to 0.030) and small design effects (ranging from 1.156 to 1.831) at either school or class levels for all variables in this study. Single level analyses were conducted instead.

6 Results

6.1 Psychometric Properties of the Instruments

Analysis showed that all scales in this study had good psychometric properties. All measurement scales were internally consistent with Cronbach's alphas between 0.66 and 0.91 (Table 2, column 3). Rasch item reliabilities were greater than 0.65 for all scales (Table 2, column 4) and item separations of all scales were greater than 2 (Table 2, column 5). Principal Components Analysis of Rasch residuals found that the Principal Component eigenvalues in the first contrast were between 1.3 and 2.0 (Table 2, column 6), which were within the acceptable threshold range of values from 1.4 to 2.1 for random noise reported by Raîche (2005), suggesting that there should be only one variance component underpinning the structure of the data.

Further, the percentage of variance in the data explained by the Rasch measures ranged from 25.1% to 61.2% (Table 2, column 7). Point-measure correlation ranged from 0.69 to 0.89 (Table 2, column 8), which was reasonable. These results support that each scale is likely to be underpinned by a single dimension. In addition, the data fit the Rasch model well: the Rasch Model Infit, i.e. weighted, Mean Squares (MNSQ) statistics were within the acceptable range of 0.5 to 1.5. There were only four items with the Rasch Model Outfit, i.e., un-weighted, MNSQ statistics outside the acceptable range (Linacre, 2014) (Table 2, columns 9 to 11).

6.2 Cluster Characteristics

Cluster analyses using the SPSS (version 21) software identified four clusters as mathematically optimal according to the AIC index, and five clusters according to the BIC index (Figure 1). Nevertheless, a three-cluster solution offered the best interpretation of the clusters as well as consistency across year levels. Thus, a three-cluster solution was selected for this study.

The SPSS (version 21) software generates a silhouette measure of cluster cohesion and separation, which in theory can range from -1 to 1. A silhouette measure of -1 means that all cases of the cluster under examination are located

Table 2 Psychometric Properties of Scales

Subscale Name	No. of Items	Cronbach's Alpha	Rasch Item Reliability	Item Separation	Eigenvalue of First Contrast
(1)	(2)	(3)	(4)	(5)	(6)
Math Achievement (P3)	29	0.66	0.65	1.36	2.0
Math Achievement (P4)	35	0.74	0.74	1.67	1.8
Math Achievement (P5)	35	0.81	0.80	2.02	1.7
Feedback Efficacy	4	0.78	0.93	3.72	1.6
Feedback Expectation	4	0.77	0.96	4.93	1.5
Personal Best Goal	7	0.84	0.99	13.30	1.8
Math Self-Efficacy	4	0.91	0.98	7.66	1.4
Self-Regulation	6	0.87	0.98	7.86	1.3

Subscale Name	Observed % of Var Explained by Rasch Measure	Range of Point-Measure Correlation	Range of Item Infit MNSQ	Range of Item Outfit MNSQ	No. of Outfit Outside (0.5 ~ 1.5)
(1)	(7)	(8)	(9)	(10)	(11)
Math Achievement (P3)	25.1	0.16 ~ 0.48	0.87 ~ 1.10	0.69 ~ 1.82	1
Math Achievement (P4)	29.1	0.21 ~ 0.48	0.83 ~ 1.32	0.54 ~ 1.89	2
Math Achievement (P5)	31.3	0.08 ~ 0.52	0.82 ~ 1.19	0.55 ~ 1.98	1
Feedback Efficacy	49.1	0.74 ~ 0.81	0.76 ~ 1.14	0.76 ~ 1.09	0
Feedback Expectation	43.0	0.69 ~ 0.76	0.88 ~ 1.20	0.93 ~ 1.16	0
Personal Best Goal	42.2	0.62 ~ 0.73	0.76 ~ 1.41	0.72 ~ 1.48	0
Math Self-Efficacy	61.2	0.87 ~ 0.89	0.89 ~ 1.06	0.89 ~ 1.07	0
Self-Regulation	47.1	0.74 ~ 0.79	0.79 ~ 1.15	0.80 ~ 1.16	0

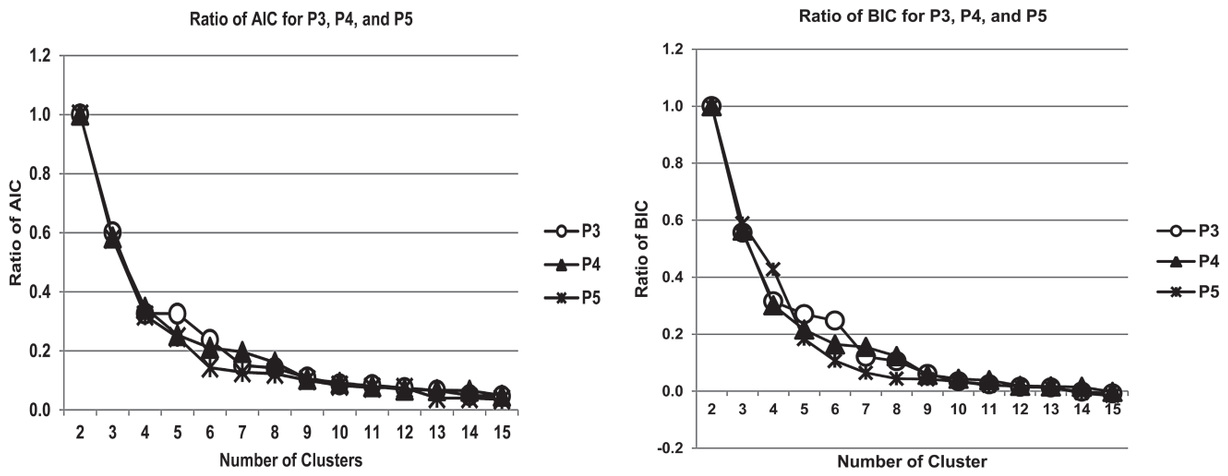

Figure 1 Ratio of AIC and BIC for P3, P4, P5

on the centre of another cluster, which represents the worst possible cluster quality. At the other extreme, a silhouette measure of 1 means that all cases for the cluster under examination are located at its centre and this represents the best possible cluster quality (Kaufman & Rousseeuw, 2005). In between these two extremes, clusters with silhouette measures less than 0.2 are considered as having poor cluster quality. Clusters with silhouette measures between 0.2 and 0.5 are of fair quality, and those with measures between 0.5 and 1 are of good quality.

The results of the cluster analysis are presented in Table 3. The results show that three clusters of students were identified at each year level. The clusters had silhouette measures ranging from 0.3 to 0.4, meaning that they were only of fair quality. The clusters at P3 and P5 were of similar sizes within their year levels. The ratios of largest to smallest clusters for P3 and P5 were 1.26 and 1.20, respectively, and each cluster accounted for about one-third of the students within the year level. At P4, cluster 2 had slightly more students (42.3%); cluster 1 had slightly less than one-third, and about one in four students were in cluster 3. The ratio of largest to smallest clusters for P4 was 1.59 (Table 3).

Cluster characteristics in terms of mean values of the cluster indicators on which the clusters were built were examined within and across year levels in order to determine unique and common characteristics. Presented in Figure 2 are the means of the three indicators, namely, mathematics achievement, feedback efficacy and feedback expectation of the three clusters within each year level. The numerical values of the mean values are presented in Table 4. It can be seen from these displays that cluster characteristics were rather consistent across the three year levels. Cluster 1 comprised students who had low mathematics performance, low feedback efficacy and low feedback expectations. Cluster 2 comprised students who had moderate mathematics performance, but high feedback efficacy and high feedback expectations. Cluster 3 comprised students who had high mathematics performance, moderate feedback efficacy and moderate feedback expectations.

Results of MANOVA showed significant differences between clusters in students' mean scores of each indicator in each grade, and the adjusted R-squared ranged from 0.301 to 0.645, which supports the uniqueness of the clusters within each grade (Table 4).

Table 3 Cluster Quality and Distribution of Students in Clusters

Year Level	No. of Clusters	Average Silhouette	Cluster Quality	Cluster 1 Frequency (row %)	Cluster 2 Frequency (row %)	Cluster 3 Frequency (row %)	Ratio of Largest to Smallest Cluster
P3	3	0.4	Fair	429 (28.80%)	521 (35.00%)	539 (36.20%)	1.26
P4	3	0.4	Fair	473 (31.10%)	642 (42.30%)	404 (26.60%)	1.59
P5	3	0.3	Fair	517 (36.60%)	463 (32.80%)	431 (30.50%)	1.20

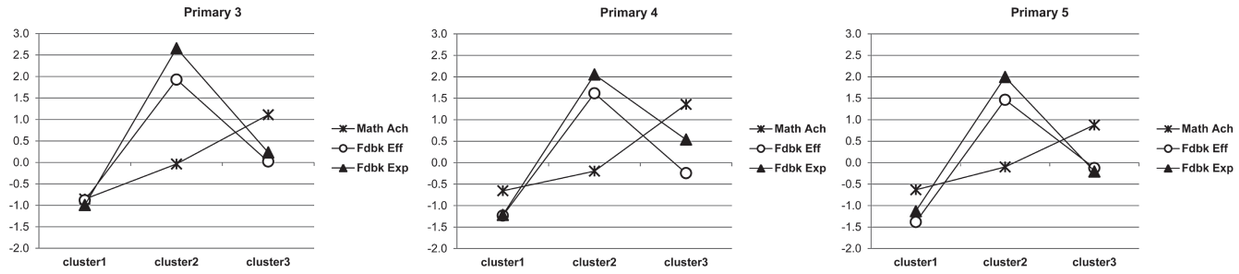

Figure 2 Characteristics of Clusters Defined by the Three Indicators: Mathematics Achievement (Math Ach), Feedback Efficacy (Fdbk Eff) and Feedback Expectation (Fdbk Exp)

Table 4 Cluster Characteristics

Year Level	Indicators	Mean			*F* Value (df1, df2)	*P* Value	Adjusted R-Squared
		Cluster 1	Cluster 2	Cluster 3			
P3	Math Achievement	-0.853	-0.037	1.109	320.203 (2, 1,486)	0.000	0.301
	Feedback Efficacy	-0.883	1.930	0.019	690.540 (2, 1,486)	0.000	0.481
	Feedback Expectation	-0.992	2.658	0.233	839.416 (2, 1,486)	0.000	0.530
P4	Math Achievement	-0.654	-0.196	1.358	642.992 (2, 1,516)	0.000	0.458
	Feedback Efficacy	-1.232	1.617	-0.244	428.024 (2, 1,516)	0.000	0.360
	Feedback Expectation	-1.217	2.053	0.538	775.186 (2, 1,516)	0.000	0.505
P5	Math Achievement	-0.631	-0.100	0.879	318.214 (2, 1,407)	0.000	0.403
	Feedback Efficacy	-1.383	1.466	-0.125	573.721 (2, 1,407)	0.000	0.549
	Feedback Expectation	-1.130	1.995	-0.205	855.825 (2, 1,407)	0.000	0.645

6.3 Self-Regulated Learning of Students in the Clusters

As presented in the previous section, three clusters of students were identified in each year level from P3 to P5. Within each year level, the three clusters were each unique in mathematics achievements and in two attitudes, namely efficacy and expectation, toward feedback from teachers, and the results were stable across the different year levels. In order to further explore the characteristics of the clusters, i.e., research question 2, the clusters within each year level were compared on three aspects of self-regulated learning, namely achievement goal, self-efficacy in mathematics, and self-regulation using MANOVA (Tabachnick & Fidell, 2007), followed by Analysis of Variance (ANOVA) to locate cluster differences with SPSS (Version 21) computer software. Student gender was used as a covariate in these analyses. Results of MANOVA followed by ANOVA after controlling for student gender showed that the three clusters within each year level differed significantly in all the self-regulation scales. That is, the clusters differed significantly in their mathematics self-efficacy, achievement goal, and self-regulation behaviours, and the results were consistent across year levels. Effect sizes in terms of partial eta-squared were moderate and ranged from 0.102 to 0.233 (Table 5).

The mean values and standard deviations of the three components of self-regulated learning, i.e., mathematics self-efficacy, achievement goal and self-regulation practices, of student clusters are presented in Table 6, and illustrated graphically in Figure 3. It can be seen that students in cluster 1, which consisted of students with low mathematics achievement and low feedback attitudes, had low mathematics self-efficacy, low achievement goals

Table 5 Cluster Comparison on Self-Regulation Scale with MANOVA and ANOVA

Year Level	MANOVA			Follow-up ANOVA			
	F (df1, df2)	prob	Partial Eta-Sq	Self-Regulation Scale	F (df1, df2)	prob	Partial Eta-Sq
P3	93.986 (6, 2,944)	< 0.001	0.161	Math Self-Efficacy	103.853 (2, 1,474)	< 0.001	0.124
				Achievement Goal	223.632 (2, 1,474)	< 0.001	0.233
				Self-Regulation	174.262 (2, 1,474)	< 0.001	0.191
P4	85.412 (6, 3,008)	< 0.001	0.146	Math Self-Efficacy	85.474 (2, 1,506)	< 0.001	0.102
				Achievement Goal	208.894 (2, 1,506)	< 0.001	0.217
				Self-Regulation	148.320 (2, 1,506)	< 0.001	0.165
P5	81.259 (6, 2,772)	< 0.001	0.150	Math Self-Efficacy	81.125 (2, 1,388)	< 0.001	0.105
				Achievement Goal	146.752 (2, 1,388)	< 0.001	0.175
				Self-regulation	157.711 (2, 1,388)	< 0.001	0.185

Table 6 Mean and Standard Deviation of Clusters of Self-Regulated Learning

Year Level	Self-Regulated Learning	Cluster 1	Cluster 2	Cluster 3
P3	Math Self-Efficacy	-0.110 (2.916)	2.293 (3.004)	1.887 (2.773)
	Achievement Goal	-0.110 (2.916)	3.083 (1.548)	1.864 (1.539)
	Self-Regulation	0.636 (2.368)	3.185 (2.030)	1.839 (1.818)
P4	Math Self-Efficacy	-0.789 (3.124)	1.103 (3.138)	1.432 (3.013)
	Achievement Goal	0.823 (1.712)	2.838 (1.568)	1.947 (1.475)
	Self-Regulation	0.593 (2.197)	2.756 (1.990)	1.805 (1.817)
P5	Math Self-Efficacy	-0.538 (3.044)	0.939 (3.175)	1.710 (2.841)
	Achievement Goal	0.926 (1.540)	2.579 (1.542)	1.619 (1.345)
	Self-Regulation	0.575 (1.965)	2.709 (1.850)	1.469 (1.714)

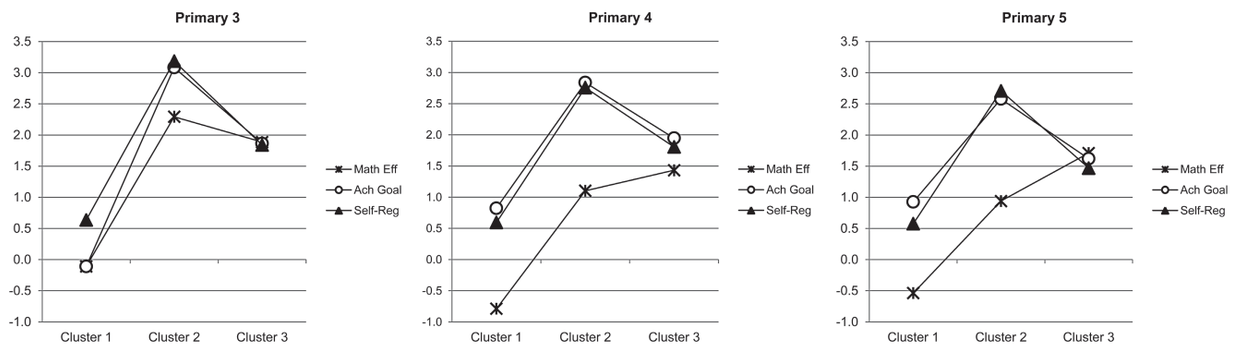

Figure 3 Profile of Mathematics Self-Efficacy, Achievement Goal and Self-Regulation for Clusters 1, 2, and 3 at Year Levels Primary 3, 4, and 5

and low self-regulation practices. Students in cluster 2, which consisted of students with moderate mathematics achievement and high feedback attitudes, had moderate mathematics self-efficacy, but high achievement goals and high self-regulation practices. Students in cluster 3, those with high mathematics achievement and moderate feedback attitudes, had moderate (for P3 and P4) or high (for P5) mathematics self-efficacy, moderate achievement goals and moderate self-regulation practices. In other words, cluster 2 and cluster 3 were similar in their mathematics self-efficacy (except P5), but differed in their achievement goals and self-regulation practices.

7 Conclusion and Direction for Future Research

This study aimed to explore the relationship between feedback attitude and mathematics achievement from the perspective of students. Using a person-centred approach, the study cluster analysed primary students' mathematics achievement and attitudes toward feedback, and examined the profiles of self-regulated learning of students in the clusters. Three clusters of students with distinct characteristics of mathematics achievement and feedback attitudes were identified at each year level. The first cluster comprised students who were low achievers in mathematics, who did not consider feedback to be useful, and who had low expectations of feedback from teachers. The second cluster comprised students who were intermediate in their achievement, had high efficacy of feedback and high expectations of feedback from teachers. The third cluster comprised high achievers; students who had moderate efficacy of feedback and moderate expectations of teacher feedback. The three clusters were roughly the same size at P3 and P5. At P4, cluster 3 was smaller and cluster 2 larger than cluster 1. Consistently across year levels, however, were the cluster profiles of self-regulated learning. At all year levels, students in cluster 1 had low self-efficacy in mathematics, set low achievement goals and had low practice of self-regulation. Students in cluster 2 and cluster 3 both had moderate mathematics self-efficacy. They differed in terms of their achievement goals and self-regulation practices, being high for cluster 2 and only moderate for cluster 3.

These results showed a clear tendency that low achieving students were associated with the lowest feedback attitude, and high achieving students were associated with moderate feedback attitude, but the most striking finding was that students of intermediate achievement expressed the strongest desire for teachers to help them. Hence, this last group of students were those learners who refused to give up hope. They recognised the usefulness of feedback in helping them and they expected the teachers to provide them with feedback support. They were also the ones who believed in their own ability to do well in mathematics -- at P3 these students even had slightly higher mathematics self-efficacy than the high achievers, set high achievement goals and exercised strong self-regulation in their learning. The message from this intermediate group was very clear: "We want to excel. Please help us!"

Our results extended findings of recent research (Baker et al., 2013; Harks et al., 2014; Karakaş, 2011; Yoshida, 2010) that highlighted the importance of perceived usefulness of feedback by the receiver in that this study identified the associations among perceived feedback usefulness, feedback expectation, students' current achievement, and their self-regulated behaviours. Feedback alone might not be the panacea. Rather, the dynamic interaction among a number of factors, including perceived feedback usefulness, expressed hope for teacher support, identifying achievement targets, self-belief in ability to succeed, and willingness to invest effort for improvement, contribute to academic achievement. Future research should explore how these factors interact to affect outcomes.

In line with previous research (e.g., Gabelica et al., 2012; Hattie & Timperley, 2007; Kluger & DeNisi, 1996), this study found that feedback did not automatically lead to positive effects on learning, not unless students held beliefs in the usefulness of feedback and in their own capability to learn. Causal relations between feedback efficacy, self-efficacy and achievement should be further investigated using longitudinal studies.

Further, although the cross-sectional design of this study precluded us from drawing any conclusions on trend, it is worrying that the group size of cluster 2, those students yearning for help, 'shrunk' from 42% at P4 to 33% at P5, with a corresponding 'increase' from 31% to 37% in the size of cluster 1, those who had no expectations of feedback. Developmental studies should be conducted in the future to chart the longitudinal change of students in their expectations of feedback in association with changes in their academic achievement.

The results of this study have noteworthy implications for teachers. Student engagement including their attention to feedback, the understanding of the meaning of feedback, and using feedback to regulate subsequent learning efforts (Carless, 2006; Dennis et al., 2012; Hyland, 2013) are of great importance for feedback to be effective in improving performance (Handley et al., 2011; Price et al., 2011; Quinton & Smallbone, 2010). Teachers should develop competencies in providing feedback as a guidance process, as advocated by Beaumont et al. (2011), in which guidance is given at the assignment preparatory stage, during the in-task phase, as well as providing performance feedback

and feed-forward guidance, in order to enhance perceived usefulness of feedback by students. Further, the uptake and utilisation of feedback should be monitored by both students and teachers.

Finally, in addition to the longitudinal studies mentioned above, the current study can be extended in at least three ways. First, the reasons underpinnings students' perceived low feedback efficacy and their low feedback expectations, particularly for students of low mathematics achievement and, to a lesser extent, students of high achievement, should be further examined. Second, one size might not fit all. It is important for researchers to investigate the content and delivery strategies of feedback in order to suit the different needs of students at various achievement levels and with different self-efficacies in learning the subjects. Third, the participants of this study were students at primary levels 3 to 5 studying mathematics in Hong Kong where examination pressure was well-documented. The extent to which findings of this study could be generalised to other subjects at different year levels, cultural backgrounds and geographical locations could be explored. Understanding the feedback process for students of different aspirations and backgrounds should make important contributions to educational and psychological fields. It is hoped that this study has made it possible to follow up on these issues in the future.

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Possibilities and Challenges of Implementing Self-Regulatory Instruction in Hong Kong Chinese Language Classes

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Abstract

Self-regulated learning (SRL), comprising elements of strategy use, metacognition and motivation, has been identified as a key factor of successful learning in many previous studies. SRL has also been widely advocated by the Hong Kong Education Bureau since its curriculum reform. Besides natural maturation, research findings have highlighted the important role of the classroom environment in developing students' SRL. Based on a series of studies conducted in Hong Kong Chinese language classes, this paper discussed the possibilities and challenges of implementing SRL-based instruction in Hong Kong. Participants in this series of studies were 31 teachers and 1,121 Secondary 4 students in Hong Kong. Both quantitative and qualitative data were collected to provide a comprehensive understanding of teaching and learning in Chinese language classes from the perspective of SRL. On the one hand, the results indicated that Chinese language teachers generally held a positive attitude towards implementing SRL-based instruction and most of the features of SRL-based instruction showed positive relations with Hong Kong students' strategy use, motivation and reading performance. These findings support the advantages of applying the principles of SRL-based instruction in Hong Kong classrooms to facilitate students' learning. On the other hand, many teachers had reservations about increasing the degree of autonomy in their classrooms. A high degree of student autonomy was also found to be associated with negative learning outcomes. The effects of contextual and cultural factors on teaching and learning in Chinese classrooms and suggestions for developing Chinese students into self-directed learners are discussed.

Keywords: Chinese language instruction, Hong Kong students, self-regulated learning

1 Self-Regulated Learning and Its Importance

Self-regulated learning (SRL) is widely viewed as a crucial element of successful learning (Perry, Phillips, & Dowler, 2004; Pintrich & Zusho, 2002). Although the conceptualization of SRL varies in different theoretical perspectives, the most common definition of SRL comprises elements of strategy, metacognition, and motivation (Horner & Shwery, 2002; Perry, 1998; Perry, Hutchinson, & Thauberger, 2007; Pintrich & Zusho, 2002; Winne & Perry, 2000; Zimmerman, 2001). Self-regulated learners are metacognitive in goal setting and self-evaluation; strategic in applying effective learning strategies to optimize their learning processes and products; self-efficacious, intrinsically motivated, and emotionally mature (Perry, 1998; Perry et al., 2007).

In reading research, SRL has also been found to be an essential factor of students' reading development (Horner & Shwery, 2002; Housand & Reis, 2008; Paris & Paris, 2001; Perry et al., 2007). Significant relations between students' use of reading strategies, reading motivation and comprehension have been supported in many previous studies (e.g., Brown, 2002; Guthrie & Wigfield, 2000; Pressley, El-Dinary, Wharton-McDonald, & Brown, 1998). Good readers are also self-regulated learners who are skillful at using a repertoire of reading strategies before, during and after reading a text and believe they can read well because of their active and strategic reading (Hilden & Pressley, 2007).

2 Instructional Practices that Promote Self-Regulated Learning

Although the advantages of SRL have been well documented in previous research, many children do not naturally develop into self-regulated learners as they grow up (Baker, 2005; Bembenutty, 2011). Studies into the relation between classroom context and SRL have highlighted the important role of instructional practices that may promote and inhibit students' SRL development (Butler, 2002; Paris & Paris, 2001; Pintrich & Zusho, 2001; Wolters & Pintrich, 1998). Based on the related theories and empirical studies on SRL and reading research (Housand & Reis, 2008; Lombaerts, Engels, & van Braak, 2009; Perry, 1998; Perry, Phillips, & Hutchinson, 2006; Perry & VandeKamp, 2000; Perry, VandeKamp, Mercer, &

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Nordby, 2002; Perry et al., 2004, 2007; Pintrich, Roeser, & DeGroot, 1994; Schunk & Zimmerman, 1997; Turner, 1995), the following four important principles of reading instruction are identified to constitute a high-SRL classroom context:

1. Nature of task:
   Direct instruction in domain knowledge and strategic skills is emphasized in the teaching content of SRL-based instruction to establish a solid foundation for students to develop into self-regulated learners. The learning materials and activities in SRL-based instruction should be open, complex, and authentic to facilitate students' higher-order thinking skills and motivation in learning.
2. Instrumental support:
   During the initial developmental stage of SRL, teacher support, such as modeling, coaching, and scaffolding, serves as a major means of transforming students from other-regulation to self-regulation. Peer support through cooperative learning activities is also useful to enhance students' self-regulatory skills and motivation.
3. Autonomy structure:
   SRL-based instruction is different from the teacher-dominated authority structure in traditional classrooms. It emphasizes the importance of giving students a certain amount of control over their learning to promote students' intrinsic interest and responsibility in learning, such as guiding them to set up personal goals and determine their own learning progress, providing choices of assignment types and formats for them to choose.
4. Evaluation practices:
   Assessment in high-SRL contexts is embedded in ongoing classroom activities. Students are encouraged to focus on personal progress rather than competing with each other. Moreover, involving students in self- and peer-evaluation is an effective way to enhance their metacognition and self-efficacy.

3 Traditional Chinese Culture, Curriculum Reform, and Self-Regulated Learning

The concept of SRL is mainly derived from Western theories and studies. At first glance, SRL's emphasis on students' active role in learning seems to contradict the traditional view of teaching and learning in Chinese contexts. Influenced by Confucian Heritage Culture (CHC), Chinese classes are always described as teacher-centered and authoritarian. Instructional practices in traditional Chinese classes tend to be mostly expository and focus on knowledge transmission and drilling for external examinations. Teachers in Chinese schools are considered authorities and superior. Chinese students are often stereotyped as passive learners who always rely on their teachers' instruction and rote-based learning at the expense of critical thinking (Gow, Balla, Dember, & Han, 1996; Ho, 1994, 2009; Ho, Pang, & Chan, 2001). According to the observations of some researchers, the CHC-influenced instructional approach is still very common in current Chinese educational settings. The packed curriculum and highly competitive examination system in many Chinese societies may exaggerate the influence of this traditional approach on Chinese teachers' daily practices (Biggs, 1996; Kwok, 2004; Morrison, 2006; Pong & Chow, 2002).

While the Confucian culture and competitive learning environment in Chinese societies seem antithetical to the concept of SRL, the importance of SRL has been increasingly emphasized in recent studies and curriculum reform in Chinese societies. Consistent with the findings in Western studies, the positive impacts of SRL on students' reading development have received substantial support in studies conducted among Chinese students (Chan, & Sachs, 2008; Cheng, 2001; Law, Lau & Chan, 2003; Zhang & Wu, 2009). It was found that Chinese students also showed a positive attitude towards self-directed learning (Gan, 2009; Neber, He, Liu, & Schofield, 2008). At the end of the 20th century, Hong Kong started a large-scale curriculum reform in basic education that continues today. Similar to the educational reform in other East Asian societies, such as China, Singapore and Japan, many Western educational theories and concepts have been introduced in the new curriculum. The main theme of curriculum reform in Hong Kong is "Learning to Learn," highlighting the change of focus from "teaching" to "learning," and a new emphasis on the process of learning rather than memorizing facts (Hong Kong Curriculum Development Council [HKCDC], 2001a). SRL is thus advocated as one of the main initiatives of the curriculum reform and this new concept of learning soon aroused the interest of many front-line practitioners in Hong Kong.

4 SRL Studies Conducted in Hong Kong Chinese Language Classes

The curriculum change in Hong Kong provides a good context for studying SRL in a Chinese society. Different from many previous studies that have investigated SRL from a general perspective, and assuming that SRL is a relatively general and stable process that operates in the same way across different subjects, the author conducted a series of studies to investigate SRL specifically in Chinese language classes. Chinese language is generally regarded as a very traditional subject in Hong Kong. Descriptions of Chinese language teaching, such as teacher-dominated, focusing on knowledge transmission and drilling (Tse

et al., 1995) well represent a typical CHC instructional approach. Due to curriculum reform, the Chinese language curriculum in Hong Kong has been dramatically changed from the traditional teacher-centered and knowledge-based approach to one that is student-centered and competence-based. The new Chinese language curriculum shares many features with SRL-based instruction, such as emphasizing the development of student independent language skills, allowing more flexibility for teachers to select reading texts and other teaching materials, encouraging teachers to adopt a more student-centered pedagogy instead of instilling knowledge to students using didactic methods, and to make use of formative assessment to facilitate student learning (HKCDC, 2001b). Studies concerning the implementation of the new curriculum, however, revealed great variations among teachers in their acceptance and implementation of the new instructional approach (Lau, 2006, 2007a, 2007b; Tam, 2006; Wong, 2005). The context of curriculum change provides a good opportunity to examine the teaching and learning process in Chinese language classes from the SRL perspective and introducing SRL-based instruction to Chinese teachers.

Although Western studies have clearly demonstrated the positive effects of SRL on learning, it should not be assumed that the SRL model can be applied without operational modifications in the Chinese context, given the very different values and socialization processes in CHC. Since most of the previous Chinese studies have uncritically adopted the Western developed SRL framework and mainly relied on survey methods to measure Chinese students' SRL, the potential effects of cultural and contextual factors on teachers' instruction and students' self-regulatory processes have not yet been explored. Against this background, a series of studies were conducted in Chinese language classes using quantitative and qualitative methods. These studies sought to answer two major questions. The first question aimed to find out what specific instructional features facilitated and inhibited Chinese students' SRL development. The second question aimed to understand how Chinese teachers perceived and implemented SRL-based instruction and the affecting factors behind it.

5 Pilot Study and Initial Findings

A pilot study was conducted in the academic year of 2008/2009 to validate the measuring instruments and initially explore the possibility of incorporating SRL-based instruction in Chinese language classes. A Band 2 school[1] in Hong Kong was invited to join a one-year collaborative project with the researcher. After discussing with the Chinese language teachers in this school, they suggested implementing the school-based programme in Secondary 3. A SRL-based reading instruction program was jointly designed by the researcher and six Chinese language teachers from this school based on a "TSAE framework" (Instructional **T**ask, instrumental **S**upport, **A**uthority structure, and **E**valuation practices) derived from the four major principles of SRL. Then the teachers implemented the program with 197 Secondary 3 students.

A detailed description of the research design and findings of this pilot study were reported in Lau (2011). In brief, the findings of pre- and post-test comparison using repeated measures indicated students significantly improved their intrinsic motivation, increased their use of self-regulated and comprehension strategies, and obtained better reading performance after the SRL-based program. From the interview data, both teachers and students showed positive attitudes towards this new instructional approach. Teachers were observed to make changes to their reading instruction by incorporating most of the principles of SRL-based instruction, such as adding strategy instruction in their daily teaching, and increasing the use of authentic teaching materials, open tasks and group activities. However, a common phenomenon observed in most of the lessons was the dominating role of the teacher in the classroom. From the interview and observation data, both teachers and students regarded teacher control as a necessary component in Chinese classes.

6 Teaching and Learning in Current Chinese Language Classes

After the pilot study, the collaborative project was expanded to six secondary schools in the academic year of 2009/2010. To ensure a representative sample, the participating schools consisted of equal numbers of schools from different bandings. After discussing with the heads of Chinese language panel in these schools, most of them preferred to implement the school-based programme in Secondary 4. The project involved 31 Chinese language teachers and 1,121 Secondary 4 students. At the beginning of the project, pre-test data, including students' reading performance, their self-reported strategy use, motivation and perception of reading instruction, teachers' perception of reading instruction and current instructional practices, was collected by various quantitative and qualitative measures. The focus of the pre-test study was to explore the characteristics of Hong Kong students and the current instructional practices in Chinese language classes from the perspective of SRL. It aimed to clarify whether the

[1] Under the Secondary School Place Allocation system in Hong Kong, all secondary schools can generally be categorized into Band 1, 2, and 3 that mainly admit the highest, middle, and lowest 33.3% of students, respectively.

stereotyped impressions of CHC learners and classroom contexts were still valid after curriculum reform and whether the proposed relations between classroom contexts and students' SRL in the Western SRL model could also be applied in a Chinese educational context.

A detailed description of the research design and findings of the pre-test study were reported in Lau (2012). According to the findings of questionnaires, interviews and classroom observations, students involved in this study had low self-confidence and tended to rely on their teachers' guidance rather than self-directing their own learning process. These findings were consistent with the impression that Chinese students are passive learners. At the same time, however, students were found to possess certain characteristics of self-regulated learners, including a moderate level of comprehension and self-regulatory strategy use, a low level of negative reading behaviors, and a high level of intrinsic motivation. Using the four major principles "TSAE" of SRL instruction to examine teachers' and students' perceptions of current reading instruction in their Chinese language classes, both perceived a moderate to high degree of "T" and "S" but a relatively low degree of "A" and "E" in their classes. Classroom observations revealed that the high degree of instrumental support was mainly from teacher support. In line with the curriculum reform, some teachers put more emphasis on skill-based instruction, adopted interesting learning materials and activities, and used formative assessments in their teaching. However, teachers continued to assume great responsibility and authority in class. Cooperative learning, independent reading activities, and self- or peer-evaluation were rare in most of the observed classes.

The relation between Chinese reading instruction and students' SRL and reading performance was examined using path analysis and then qualitative analysis on interview and observational data was used to triangulate and supplement the quantitative findings. The findings of path analysis were generally consistent with previous Western studies, indicating that SRL-based instruction was positively related to students' use of comprehension and self-regulatory strategies, intrinsic motivation and reading performance, and negatively related to their negative reading behaviors. A careful examination of the impacts of different principles of SRL-based instruction, however, suggested some of the principles should be more beneficial to Chinese students' learning than others. Among the four major principles of SRL-based instruction, instrumental support showed the strongest positive relation with students' strategy use, intrinsic motivation and reading performance. In contrast, although student autonomy had a positive relation with students' strategy use, it was positively related to their negative reading behaviors and negatively related to their reading performance. Classroom observations and student interviews indicated that teacher support was crucial for establishing students' learning foundation and maintaining their self-confidence and intrinsic motivation when they faced difficulties or progressed to high-level learning. Without sufficient teacher scaffolding, a high degree of autonomy was found to result in poor student performance. Indeed, both teachers and students felt satisfied with the authority structure of their class. Students asked for more participation rather than a more leading role in their learning.

7 Chinese Teachers' Perceptions and Implementation of SRL-Based Instruction

A major purpose of the collaborative project was to explore the feasibility of incorporating SRL-based instruction into the daily teaching of Chinese language classes. After the pre-test study, the research focus was on investigating what changes teachers had made to their instructional practices, how their perceptions changed during the collaborative project, and what factors affected these changes. To familiarize teachers with the principles of SRL-based instruction, the TSAE framework with concrete examples was introduced to all participating teachers in a series of teacher professional training workshops at the beginning of the project. Teachers from each school could select one to two modules to design their school-based SRL program. During the project, the researcher worked closely with teachers in regular collaborative meetings to support their instructional design and evaluation. Multiple measures, including classroom observation, teacher and student interviews, and reading instruction inventory, were adopted to assess to what extent teachers applied the principles of SRL in their teaching and how student learning was affected.

A detailed description of the research design and findings of the collaborative project were reported in Lau (2013). Although the concept of SRL was new to most of the participating teachers, they generally had positive attitudes towards this innovative instructional approach before and after the project. Most of them were satisfied with the effectiveness of SRL-based instruction on enhancing their students' reading ability and motivation. Pre- and post-test comparisons indicated both teachers and students perceived a higher degree of SRL-based instruction in their Chinese language classes and students improved their strategy use, motivation and reading performance at the end of the project. Specifically, teachers reported changes on "T," "S" and "A" whereas students only perceived changes on "T" and "S." Data from interviews and classroom observations revealed that changes mainly

occurred in the nature of instructional tasks and teacher support. Instead of using teacher-centered lecturing to explain the content of textbooks to students, more teachers attempted to integrate strategy instruction into their original text-based instruction, increased the use of interesting reading and multimedia materials to supplement textbooks, and designed various types of activities and discussions to develop students' independent reading skills when they implemented their school-based program. Concerning the principles of "A" and "E," most of the teachers only increased the opportunities for student participation but student-directed activities and evaluation were seldom observed in most of the classes.

Summarizing the findings from different data sources, several factors affecting teachers' acceptance and implementation of SRL-based instruction, including cultural, contextual, student and teacher factors, were identified. In brief, curriculum reform and support from the researcher and school administrators were important factors for motivating teachers to experiment with innovative instruction and facilitating their continued implementation. Due to the influences of traditional Confucian culture and the previous curriculum, it was easier for teachers to incorporate the principles of "T" and "S" that emphasized the role of the teacher in instructional planning and providing support to students' learning rather than those of "A" and "E" that emphasized the leading role of students in monitoring and evaluating their own learning. Students' ability and attitudes are also essential for SRL. Teachers with weak and passive students admitted that they had more reservations about increasing the degree of student participation and autonomy in their classes. Lastly, while all teachers inevitably faced various constraints when implementing their school-based program, those who were more enthusiastic about professional development were found to be more willing to try most of the principles of SRL-based instruction.

8 Possibility of Implementing SRL-Based Instruction in Chinese Classrooms

SRL has been widely recognized as an essential element of successful learning in Western studies (Perry et al., 2004; Pintrich & Zusho, 2002). Due to the emphasis of teacher authority and knowledge transmission in traditional Confucian culture (Gow et al., 1996; Ho, 1994, 2009; Ho et al., 2001), it is unclear whether SRL is accepted by and suitable for Chinese teachers and students. Findings of the studies reported above provided useful information for discussing the applicability of SRL in Chinese contexts. Consistent with the view that classroom environment is important in shaping students' approaches to SRL (Butler, 2002; Lombaerts et al., 2009; Perry, 1998; Pintrich et al., 1994; Turner, 1995; Wolters & Pintrich, 1998), a high-SRL instructional environment was found to be positively related to Chinese students' strategy use, reading motivation, and reading performance. Similar to those studies conducted in Western classrooms (Hilden & Pressley, 2007; Perry & VandeKamp, 2000; Zimmerman, 2001), the students that participated in the pilot and main study also made substantial improvements in their strategy use, motivation and reading performance after receiving SRL-based instruction in their Chinese language classes. These findings provide initial support for the possibility of implementing this new instructional approach in Hong Kong. Based on their experience with the collaborative project, teachers' positive perception of SRL-based instruction and high tendency to sustain its implementation after the project were due mainly to their satisfaction with its effectiveness on enhancing students' reading ability and motivation. This suggests that whether an instruction is rooted in Western theories or traditional Confucian culture, it is possible to be accepted by teachers as long as it is beneficial to their students' learning (Avalos, 2011; Gersten & Dimino, 2001; Gersten, Vaughn, Deshler, & Schiller, 1997).

Besides the universal positive impacts of SRL-based instruction on learning, contextual and cultural factors are important when discussing the feasibility of applying the principles of SRL-based instruction in non-Western educational contexts. At the policy level, the traditional teaching and learning approach in many CHC societies are now facing challenges from curriculum reform. Since the end of the 21st century, many innovative instructional theories have been introduced to Hong Kong teachers with the curriculum reform. From the findings of the studies reported above, the congruency between SRL-based instruction and the new Chinese language curriculum was the main reason for the schools to participate in the collaborative project. Since the emphasis of the current curriculum (HKCDC, 2001b) and public examination (HKEAA, 2005) has been changed from knowledge memorization to independent language skills, many teachers find they can no longer rely on traditional didactic instruction. Thus, the model of SRL-based instruction provides a well-established framework for teachers to restructure their instructional practices to a more effective way of developing their students' learning ability. At the school level, more and more schools in Hong Kong are willing to increase resources and participate in collaborative projects to facilitate teachers' implementation of the new curriculum. Among the six participating schools, it was found that teachers who received more administrative support and had more autonomy to adjust their curriculum

were more able to fully implement their SRL program. These findings were consistent with previous studies on teacher change, suggesting that teachers tend to change their original instructional practices when the innovation is congruent with the current educational policy and they are allowed to experiment with the innovation in a safe and supportive working environment (Inos & Quigley, 1995; Pressley & El-Dinary, 1997).

Although the CHC instructional approach is regarded as antithetical to SRL, some of its features should help Chinese teachers adapt to SRL-based instruction when they first try this new instructional approach. As pointed out before, Chinese teachers have been used to assuming great responsibility and authority in class. Chinese students are also used to relying heavily on the guidance of their teacher (Gow et al., 1996; Ho, 1994, 2009; Ho et al., 2001). Findings of the studies reported above indicated that teachers were more receptive to the principles of "T" and "S" than "A" and "E." The principles of "T" and "S" emphasize the use of strategy instruction and open tasks with various forms of guidance and support to develop students' reading ability and motivation (Lombaerts et al., 2009; Perry, 1998; Perry et al., 2002; Turner, 1995). Although the nature of the task is different from traditional knowledge-based instruction, its emphasis on the supportive role of the teacher is consistent with current practices in Chinese language classes. Therefore, when the researcher provided sufficient training and technical support to the teachers, they were easily able to integrate the principles of "T" and "S" into their school-based program. Indeed, the findings of both quantitative and qualitative data revealed that teacher support was the most important instructional factor that facilitates Chinese students' learning. It suggests that it is not only easier for Chinese teachers to accept those principles with more emphasis on the role of the teacher through combinations of old and new instructional practices, Chinese students also learn better with a certain degree of teacher support and guidance rather than in a highly self-directed learning environment.

9 Challenges of Incorporating SRL-Based Instruction in Chinese Classrooms

Based on the findings of the studies reported above, challenges from cultural, contextual and personal factors are identified and discussed as follows.

Compared with the principles of "T" and "S," the principles of "A" and "E" are more difficult to apply in Chinese classrooms. Although the new curriculum has been implemented in Hong Kong for over ten years, the degree of student autonomy and self-directed evaluation in most of the classes remains low. Little changes were observed in these two dimensions of teachers' instruction even after they had received substantial professional training and support in the collaborative project. Contrary to the postulation of the SRL theory, a high degree of student autonomy was found to be associated with more negative reading behaviors and poorer reading performance. As pointed out in the last section, most of the Chinese teachers and students are accustomed to their traditional role as "authoritative leader" and "passive recipient." From the perspective of teachers, they have great reservations about giving students a high degree of freedom because it challenges their entrenched epistemologies of classroom authority structure. From the perspective of students, they also do not have enough confidence to learn independently without teacher guidance. These findings suggest that at the initial stage of introducing SRL-based instruction to Chinese classes, an appropriate use of teacher-led instruction to support students' development of learning skills and motivation should be more suitable and easily accepted by Chinese teachers and students than a dramatic change to a highly student-directed learning environment. As observed by some Chinese researchers, teacher-directed instruction should not be viewed as negative in Chinese classrooms. Effective Chinese teachers are able to organize the lesson to engage their students in active learning under their full control (Ho, 2001; Mok et al., 2001). For example, in a Chinese language class observed by Mok et al. (2001), while the teacher maintained a high degree of control on the focus of teaching and each teaching step throughout the whole lesson, he successfully engaged his students actively in enacting the story and guided them to construct a deep understanding of the story through their enactment. This kind of teacher support is consistent with the concept of SRL-based instruction. However, it should be noted that giving students autonomy to control and evaluate their own learning is an essential step in developing them from other-regulation to self-regulation (Perry, 1998; Schunk & Zimmermen, 1997; Wolters & Pintrich, 1998). After students have developed certain independent learning skills, it is a challenge for Chinese teachers to adjust their role and increase the proportion of student-directed activities in order to develop their students into real self-regulated learners.

Concerning the contextual factors, Hong Kong is well known to be a highly competitive and exam-oriented society. Although SRL is advocated in curriculum reform, preparing students for public examinations is placed in the highest priority in the minds of many school leaders and teachers. Under the examination pressure, school curriculum is generally very packed and drilling is inevitably adopted as a major form of instruction in most of the classes in Hong Kong (Biggs, 1996; Kwok, 2004;

Morrison, 2006; Pong & Chow, 2002). Such a learning environment is not favorable for promoting SRL. To develop into self-regulated learners, students must take time to sharpen their learning skills and establish their confidence through trial and error in diversified learning activities (Pintrich & Zusho, 2002; Schunk & Zimmermen, 1997). After adding open tasks and student-centered activities in their school-based SRL program, all participating schools in the collaborative project found it took much longer than their regular modules. This created a certain pressure for teachers in their tight teaching schedule. The teachers' workload was also increased because the instructional design of SRL-based instruction was more demanding than their general practices. With the support provided by the researcher and school administrators, it was relatively easy for schools and teachers to experience SRL-based instruction in a trial, short-term collaborative project. However, it would be a great challenge for them to implement SRL-based instruction throughout their entire curriculum.

The personal background of teachers and students can be a facilitating or inhibiting factor for the implementation of SRL-based instruction. Obvious variations were observed among different classes in the collaborative project. Consistent with previous studies on teacher change, teachers' pre-existing beliefs and instructional practices (Fang, 1996; Richardson & Placier, 2001) and their aspiration for professional development (Gregoire, 2003; Hargreaves & Fullan, 1992) were found to be critical factors affecting their implementation of an innovative instruction. In the collaborative project, two types of teachers were more enthusiastic to implement SRL-based instruction: those who had an obvious preference for and had already adopted some forms of student-centered pedagogy, and young teachers who were eager to improve their professional knowledge and teaching skills through participating in the project. For those teachers who had adopted teacher-centered instruction for many years or did not have a clear concept of SRL, they only implemented their school-based program on a surface level without real changes on their original teaching. In addition, SRL is not only challenging for teachers but also for students. To become self-regulated learners, students have to participate actively and engage in higher-level thinking during their learning process (Perry et al., 2002; Schunk & Zimmerman, 1997; Turner, 1995). This is especially difficult for students with low ability and poor motivation. Teachers from schools of low bandings reflected that their students had difficulty in using strategies independently and could not participate actively in cooperative tasks. Therefore, how to enhance teachers' professional development and students' learning ability is another challenge if SRL-based instruction is widely promoted to all teachers and students in Hong Kong.

10 Conclusions and Suggestions

In conclusion, in the context of curriculum reform in Hong Kong, the author conducted a series of studies to examine the applicability of the SRL theory in this CHC society and to explore the possibility of incorporating SRL-based instruction into the teaching of Chinese language, which is generally regarded as a typical CHC influenced subject. When discussing the applicability of the SRL theory in non-Western cultural contexts, McInercy (2008) has suggested that SRL should be related to positive learning outcomes regardless of the cultural background of the learners but certain cultural and educational settings may make it more difficult for some self-regulatory processes to be developed. Findings of these studies echoed with the postulation of McInercy that SRL-based instruction should also be beneficial to Chinese students but due to the cultural and contextual background of Hong Kong, principles that emphasize the supportive role of teachers are easier to implement in Chinese classes and produce more positive effects on Chinese students' learning than those that put more emphasis on student autonomy.

In response to the challenges of implementing SRL-based instruction in Hong Kong classrooms, it is suggested that a long-term collaboration between researchers and front-line teachers would be a promising approach to support a gradual change to teaching and learning in Chinese classes. It is reasonable for teachers to start with some principles that they find to be more consistent with their original beliefs and practices when they try a new form of instruction. For Chinese teachers who have adopted the traditional teacher-centered instruction for a long time, they need more time to take the big step toward a more student-centered instruction. Through long-term collaboration, teachers can develop a deeper understanding of the principles of SRL-based instruction and make continuous improvements in applying different principles more effectively by becoming involved in on-going professional training and collaborative dialogues with external experts (Gregoire, 2003; Hilden & Pressley, 2007; Perry & VandeKamp, 2000; Randi, 2004). Chinese students who are used to relying heavily on their teachers also need more time to learn how to learn independently. At the initial stage of SRL-based instruction, it is important to establish the students' knowledge base and their ability to use different learning strategies effectively by providing them sufficient teacher support. As they progress into more competent learners, teachers should gradually release the responsibility of learning to students by adjusting the proportion of teacher-directed and student-directed activities. Weak students may need more time and scaffolding in this process. Moreover, under the constraints

of the packed curriculum and examination pressure in Hong Kong, teachers may only be able to increase the proportion of SRL-based instruction at a slow pace that may take a longer time to see substantial improvement in students' learning. Therefore, it is important for the Education Bureau, school administrators, and researchers to establish a safe and supportive environment for both teachers and students in this long-term changing process (Inos & Quigley, 1995; Gersten & Dimino, 2001; Pressley & El-Dinary, 1997).

Regarding the direction of future research, a more rigorous research design is needed to confirm the effectiveness of SRL-based instruction on Chinese students' learning. In order to encourage teachers to try SRL-based instruction in their daily teaching, the research design of the pilot study and collaborative project was not rigid due to the many practical constraints in authentic school contexts. No control group was involved in the studies. Therefore, findings of these studies should be cross-replicated in future studies using a larger sample and control groups.

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The Development of a School-Based Model of Self-Regulated Learning in Hong Kong Secondary School Classrooms

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Abstract

As an international city, Hong Kong has witnessed waves of education reforms since 2000. Despite the many initiatives conducted through government policies and school practices, many of these reforms fell short of public expectation to improve the quality of students' learning. This article reports how a Hong Kong secondary school developed a school-based model of self-regulated learning (SRL) by integrating classroom practice with evidence-based theories and researches in the process of a pedagogical improvement program. Elements of good practices in SRL lesson organization are adapted from the frontline experience of Shandong schools in Mainland China, and then a holistic framework of self-regulation mechanism constructed based on international SRL theories and researches, and finally, an implementation system is developed to put into practice the lesson organization and self-regulation mechanism. Looking back on the development of SRL, this article concludes by highlighting its contribution to bridging the western paradigm of SRL and the Chinese model of SRL, and its implication for future exploration on SRL classroom practice for pedagogical improvement.

Keywords: Shandong model of SRL, SRL lesson organization and classroom practice, self-regulation mechanism, school-based model of SRL

1 Introduction

The development of self-regulated learning (SRL) in Chinese classrooms has aroused nationwide interest and captured the attention of Hong Kong schools in recent years. Against the setting of centralized education reforms in classroom teaching and learning, increasing number of schools in different regions of Mainland China are now experimenting or implementing SRL in their classrooms. Professional exchanges between the Mainland Chinese schools and Hong Kong schools have become more often than before.

In Hong Kong, the interest in SRL among the school sector grew from a general discontent with the results of local education reforms and a pursuit for self-improvement (Ho, 2012, 2013). Like Mainland China and many other parts of the world, Hong Kong has undergone a series of education reforms since 2000. Despite the effort of the government and schools, many of these reform initiatives fell short of public expectation to effect real changes in classroom practice and improve the quality of students' learning (Cheng, 2009; The Hong Kong Association of Heads of Secondary Schools, 2013; The Joint Committee of Secondary School Councils and Secondary School Principal Associations of the eighteen districts, 2011).

This article reports how a secondary school in Hong Kong, a core member of the SRL school network of the Hong Kong Association of Heads of Secondary Schools, reconstructed a model of SRL classroom practice by adapting the Mainland Chinese SRL model in Hong Kong school-based contexts and linking it to international SRL theories and research. The purpose of developing such a model is to embark on a SRL program in school for pedagogical improvement that can help teachers adapt their pedagogy and create classroom conditions that can help students become capable self-regulated learners of the 21st century.

Specifically, this article is made up of four parts. The first three parts expound the three building blocks of this school-based model, namely the lesson organization, the regulation mechanism and the intervention system, which correspond to the three different stages in the development of our model. The fourth part summarizes the main ideas and highlights the implication of this integrated school-based model for the future development of SRL.

2 The Lesson Organization -- Learning from the Mainland Chinese Classroom Experience

The first step in developing our school-based model is to look for practical experience on how to implement SRL in everyday lessons. In search of good practices of SRL in the classroom, my teachers and I visited schools in both the

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northern and southern parts of Mainland China, including Shandong and Guangdong Provinces. Our aim was to discover and explore any general rules and patterns of the organization of an SRL lesson for teachers to put into their day-to-day classroom practice.

From our observation and study, we found the Shandong model by far the most operationalized and dominant classroom model of SRL in Mainland China (Cui & Yu, 2012; Ho, 2012, 2013; Hou, Cui, Liu, & Li, 2010; Jiang & Hong, 2012; Pan & Cui, 2008; Xu, 2012). Over the past few years, many schools in different parts of Mainland China have been visiting SRL classrooms in Shandong schools, particularly the two famous schools, Dulangkou Secondary School and Changle No. 2 Secondary School, to learn from their practical experience and adapt the Shandong model into their own schools. The experience of pedagogical reform in implementing SRL in the classroom has given us a lot of useful insights for the first step of our model development.

To build up a model of SRL lesson organization, I have looked into three interrelated issues: The guiding principles, the lesson sessions, and the learning activities. By adapting some of the classroom practice of the Shandong model on these three areas, we are able to come up with an operational framework for teachers to make reference to in their daily lessons.

2.1 The Guiding Principles

In order to understand how an SRL lesson is organized, it is necessary for us to first examine the underlying guiding principles. From our study of the Shandong model, I have extracted four fundamental guiding principles and adapted them into our school-based model. As we can see, all of these guiding principles are an inversion of the traditional model of classroom teaching.

1. Learn first, then teach (先學後教 "Xian Xue Hou Jiao"):
   According to the first principle, learning comes before teaching instead of the other way round as practiced in the traditional lesson. Students are required to self-study or group study before the lesson and teachers teach only after students have done their preparation work individually or collectively, which is typically in the form of pre-study task sheets (yu xi an) specially designed by the teachers and distributed before the lesson.

2. Let learning decide teaching (以學定教 "Yi Xue Ding Jiao"):
   The second principle requires teachers adapting their teaching to the learning of their students rather than students adapting their learning to the teaching of their teachers as in traditional lesson. As students have to do their pre-study task sheets before lesson, teachers can have a better prior understanding of the level of their students and their learning difficulties before teaching and henceforth adjust their teaching accordingly.

3. Teach less, learn more (教少學多 "Jiao Shao Xue Duo"):
   Unlike traditional lesson in which teachers teach as much as possible to cover every aspect of the curriculum, our SRL lesson observes the principle of teachers teaching less so that students may learn more on their own and together with their classmates. Teachers teach only the things which students cannot understand by learning individually or collectively but can do so by being taught by their teachers.

4. Reduce load, enhance effectiveness (減負增效 "Jian Fu Zeng Xiao"):
   The fourth principle explains the purpose of the preceding three principles. As teachers teach less, they can save their labour and spend more time focusing on the most difficult parts thus helping their students more effectively. Students, instead of over-depending on their teachers, can have greater autonomy and learn how to learn more independently and effectively.
   As a whole, these four principles adapted from the Shandong model have very concisely summarized the most fundamental ideals of SRL lesson organization. They provide teachers with a clear guideline about the distinction between a SRL lesson and a traditional lesson by their lesson organization. Students learn first so that teachers can adapt their teaching, teach less but more effectively. As a result, students have more opportunity to learn by themselves and from their peers and become more capable self-regulated learners. These principles are in fact surprisingly consistent with the lesson organization of the Flipped Classroom -- a new instructional model which inverts the traditional teaching methods, first introduced in the United States and now growing in popularity in Singapore, Taiwan and Mainland China -- and is considered by some scholars a most recent development of SRL in the digital era (Bishop & Verleger, 2013; Fulton, 2012; Hamdan, McKnight, McKnight, & Arfstrom, 2013; Jin, 2013).

2.2 The Lesson Sessions

While the guiding principles explicate the underlying rationale of the lesson organization, the lesson sessions describe the observable pattern of how teachers divide their SRL lessons into different parts for different purposes. Based on the Shandong model, I have constructed a SRL lesson organization structure comprised of four basic lesson sessions.

1. Self-learning session (自學 "Zi Xue"):
   In this lesson session, students are required to learn on their own, usually before and at the beginning of a lesson or a task, and after the finish of a lesson or a task. This gives students an opportunity to take up the responsibility for their own learning and train up their independent learning capability.

2. Co-learning session (共學 "Gong Xue"):
   Unlike the self-learning session by which students learn solely on their own, the co-learning session encourages cooperative learning in groups. This usually takes place after students finish their self-learning, and after the introduction of topics and instruction of tasks by the teachers.

3. Mutual learning session (互學 "Hu Xue"):
   During this session, students learn from each other across different groups. Between-group interaction and exchanges are facilitated to promote collaboration as well as competition. This session usually follows students' finish of within group co-learning and comes before teachers' teaching.

4. Teacher-directed learning session (導學 "Dao Xue"):
   This is the only session during which teachers teach directly to the students. It is important for students to learn not only on their own and with their peers but also from their teachers to be self-regulated learners. Very often, it takes place at the beginning of the lesson, after students finish co-learning and/or mutual learning, and at the end of the lesson.

While our lesson sessions are adapted from the Shandong model, there are, however, significant differences between the two models. Unlike the original Shandong model which is highly routinized and prescriptive, demanding teachers to follow strictly a fixed sequence and even exact time allocation, as exemplified by the two very famous schools in Shandong, Dulangkou Secondary School and Changle No. 2 Secondary School (Experimental District of Weifang Shandong, 2012; Li & Li, 2009), the organization of our lesson sessions is much more flexible and dynamic. No standard pattern is mandatory in our model and teachers are given greater autonomy to adapt the organization of their SRL lessons in real context.

2.3 The Learning Activities

In an SRL lesson, the learning activities are particularly important and are closely linked to the lesson sessions. Students are required to engage in specific types of learning activities for different learning tasks with specific learning goals in different sessions of the lesson, by which their SRL is fostered in the classroom. From our observation of Shandong SRL lessons, we have identified a number of core learning activities under each of the four lesson sessions and have adapted them into our school-based model.

1. Self-learning activities:
   These are the learning activities in which students usually engage during the self-learning lesson session. They may be in the form of pre-study task completion, information search or pre-reading, reciting or reading aloud certain paragraphs and revising what have been learnt.

2. Co-learning activities:
   Students engage in co-learning activities when they are working in groups. In the co-learning lesson session, they usually compare and check answers, seek help and give help among themselves when they have difficulties, problem-solve together and give group presentation verbally and in written forms on the blackboards.

3. Mutual learning activities:
   Mutual learning activities refer to activities students engage in when interacting with students from other groups. Examples of these include: Asking and answering questions, clarifying, elaborating, supplementing and correcting answers, giving criticism and peer evaluation.

4. Teacher-directed learning activities:
   These are learning activities students are required to attend to during the teacher-directed lesson session. They include listening to teachers' introduction of topics and objectives, taking notes, following instructions on leaning tasks and activities, answering questions, making sense of and responding to teachers' feedback, explanation, conclusion and evaluation.
   With the guiding principles, the lesson sessions and the learning activities, we may now construct the organization structure of a SRL lesson (see Table 1). From the Shandong model, we have adapted its well-defined operation principles and organization framework, its embedding SRL in everyday lessons with clear procedures of learning activities connected to specific learning tasks and learning goals. According to the reports of both the teachers and students, these highly structured and organized patterns of SRL lessons help students to develop a positive, independent yet cooperative learning habit and disposition which enhance their motivation to learn, their use of learning strategies and metacognitive regulation.

However, the Shandong model also has serious limitations which our Hong Kong's school-based model must overcome. Under the influence of the centralized

Table 1 The Organization Structure of a SRL Lesson: The Four Lesson Sessions

Lesson Sessions	Key learning activities of students
Self-learning	Pre-study, information search, pre-reading, reciting & revision, etc.
Co-learning	Compare answers, problem solve, peer help & group presentation, etc.
Mutual learning	Ask & answer questions, clarify, correct, elaborate, criticize & evaluate, etc.
Teacher-directed learning	Listen, take notes, follow instructions, answer, interpret & respond, etc.

education system in Mainland China, there is a tendency for the Chinese model to be overly top-down, too rigid and too prescribed to allow sufficient flexibility, spontaneity and creativity to cater for individual differences and personalized learning. Another limitation of the Shandong model is its over-reliance on practical application and the lack of a coherent theoretical framework and evidence-based research. Without an evidence-based understanding of the underlying mechanism of SRL in the classroom, practitioners may easily resort to personal intuition and practical experience of the past or other people. To tackle this problem, we have to turn to our next step of model development.

3 The Self-Regulation Mechanism -- Linking Practice to International SRL Theory and Research

The second step in developing our school-based model is to substantiate our SRL lesson organization structure with a well-informed knowledge base. To do this, we have conducted a comprehensive literature review of international SRL theory and research and a series of training workshops for teachers. Our ultimate aim is to help teachers to acquire an overall understanding of the self-regulation mechanism underlying students' self-regulated learning so that they can organize and conduct their SRL lessons more effectively.

In the following paragraphs, I first analyzed the self-regulation processes of students in the classroom, then identified a set of proven strategies which can facilitate these self-regulation processes as validated by SRL research, and finally drew up a holistic framework of self-regulation in the classroom.

3.1 The Self-Regulation Processes

SRL is a proactive learning process, in which students apply and adapt self-regulation strategies related to a number of dimensions to attain specific goals (Duckworth, Akerman, MacGregor, Salter, & Vorhaus, 2009; Montalvo & Torres, 2004; Pintrich & Groot, 1990; Rhee & Pintrich, 2004; Zimmermann & Pons, 1986, 2004). Based on the classification by the Pintrich and Groot (Pintrich & Groot, 1990), Zimmermann and Pons (1986, 2004), the following four key dimensions of self-regulation processes are adopted in our school-based model.

1. Motivational/affective regulation:
   Students show a set of motivational beliefs and adaptive emotional responses and adjust them to specific learning contexts and tasks.
2. Behavioral/contextual regulation:
   Students control and regulate personal and interpersonal engagement, academic tasks, modify their learning environments and seeking help from teachers and classmates.
3. Cognitive regulation:
   Students use a series of cognitive strategies to attend to, retrieve, elaborate, organize and possess critically information in completing specific learning tasks.
4. Meta-cognitive regulation:
   Students plan, control and direct their mental processes, reflect, evaluate and adjust their learning strategies towards the achievement of personal and collective goals.

From literature review, we know that these four dimensions of self-regulation processes are conceptually distinct but empirically interrelated. Whether students can effectively integrate these processes in the classroom will determine the effectiveness of our SRL lessons.

3.2 The Facilitating Strategies

To help students regulate their learning, we need appropriate strategies to facilitate the above self-regulation processes. From international SRL theory and research, we have identified a number of facilitating strategies (Duckworth et al., 2009; Goetz, Nett, & Hall, 2013; Paris, 2004; Paris & Paris, 2001; Rhee & Pintrich, 2004; Schunk & Zimmerman, 1997; Zumbrunn et al., 2011) and have them classified into three main types in our school-based model.

1. Teacher instruction strategies:
   e.g., direct instruction and modeling; guided and independent practice; challenging goals and authentic tasks; reflective construction; progress feedback; summative and formative assessment.
2. Peer support strategies:
   e.g., reciprocal teaching, cooperative and collaborative

learning; peer observation, help and demonstration; group discussion, debate, critique and evaluation.

3. Self-learning strategies:
   e.g., self-understanding of personal learning styles and strategies; self-evaluation of what one knows and does not know; periodic self-assessment of learning goals, processes and outcomes; self-management of thinking, effort and affect; volitional strategies and cognitive behavioral training.

As we can see, these three types of facilitating strategies correspond very well with the four lesson sessions of a SRL lesson in our school-based model. The first type Teacher instruction strategies falls under the Teacher-directed lesson session; the second type Peer support strategies falls under the two lesson sessions co-learning and mutual learning, whereas the third type Self-learning strategies corresponds exactly to the lesson session self-learning.

3.3 A Holistic Framework

By linking the self-regulation processes and the facilitating strategies to our lesson organization structure of lesson sessions and learning activities we discussed in the preceding section, we are able to develop a holistic framework of self-regulation mechanism in a SRL lesson (see Table 2).

In the four lesson sessions of a SRL lesson, students are

Table 2 A Holistic Framework of SRL Lesson Sessions, Learning Activities, Facilitating Strategies and Self-Regulation Processes

SRL lesson sessions & learning activities	Facilitating strategies used	Self-regulation processes activated
1. Self-learning Before/at the beginning/end of a lesson/task, students:	**Self-learning strategies**	
- understand learning goals, tasks & assessments - establish task interest & value - build expectation of self-efficacy - invoke feeling about tasks & assessments	periodic self-assessment of learning goals, processes & outcome	Motivational regulation
- get prepared for lesson - engage in pre-lesson & during-lesson tasks - observe classroom routines - avoid distraction	volitional strategies & cognitive behavioral training	Behavioral regulation
- activate & relate to previous learning - locate key points - apply learning strategies to complete tasks - identify learning difficulties	personal learning styles and strategies	Cognitive regulation
- self-reflect & self-record - self adjust expectation, behavior & strategies	self-evaluation of what one knows & does not know, self-management of thinking, effort & affect	Meta-cognitive regulation
2. Co-learning After students finish self-learning, and teacher's allocation & instruction of a task, Students:	**Peer support strategies**	
- gives encouragement to each other - receive positive reinforcement from members	cooperative & collaborative learning	Motivational regulation
- seek help from members - give help to members - divide duties & tasks - sit in groups & share materials	cooperative & collaborative learning, peer help	Behavioral regulation
- check each other's answers - exchange & discuss answers - make compromise & decide best answers - present group work	reciprocal teaching, peer observation, help & demonstration; group discussion	Cognitive regulation

Table 2 A Holistic Framework of SRL Lesson Sessions, Learning Activities, Facilitating Strategies and Self-Regulation Processes (continued)

SRL lesson sessions & learning activities	Facilitating strategies used	Self-regulation processes activated
- group reflect & group-record - group adjust expectation, behavior & strategies	Monitoring & evaluation of self and group performance	Meta-cognitive regulation
3. Mutual learning After students finish within-group learning, students:	**Peer learning strategies**	
- compete for group performance - receive positive & negative reinforcement from other groups	cooperative and collaborative learning	Motivational regulation
- stay focused on tasks - interact with other groups	reciprocal teaching	Behavioral regulation
- ask questions - correct & modify answers - challenge & criticize others' answers - give evaluation of performance & outcomes of other groups	debate & critique	Cognitive regulation
- group evaluate & group record - group adjust expectation, behavior & strategies	monitoring & evaluation of self and group performance	Meta-cognitive regulation
4. Teacher-directed learning At the beginning/end of lesson, after students finish within-group and between-group learning, students:	**Teacher instruction strategies**	
- understand learning goals, tasks & assessments - establish task interest & value - build expectation of self-efficacy - invoke feeling about tasks & assessments	direct instruction & modeling	Motivational regulation
- attend to teacher's presentation - follow teacher's instructions	direct instruction & modeling	Behavioral regulation
- respond to questions & feedback - clarify confusion & misconception - deepen understanding - construct knowledge	guided & independent practice, challenging goals & authentic tasks, progress feedback, reflective construction	Cognitive regulation
- conclude & draw implications - extend learning	reflective construction, summative and formative assessment	Meta-cognitive regulation

encouraged by the teacher to engage in different learning activities, in which specific facilitating strategies are used which in turn activate the self-regulation processes. At different times in a SRL lesson, at the beginning and the end of the lesson, before and after different tasks, different self-regulation processes are activated as the teacher organizes his lesson into different sessions with different learning activities. As shown in Table 2, the core learning strategies in the Self-learning session involve mainly Self-learning strategies, those in the Co-learning and Mutual learning sessions both involve mainly Peer learning strategies, whereas those in the Self-learning session involve mainly Teacher instruction strategies. Despite the differences in learning activities and facilitating strategies, the four lesson sessions are all connected to the four key dimensions of self-regulation processes -- the motivational, the behavioral, the cognitive and the meta-cognitive.

Based on this holistic framework, teachers can make

informed decision as to how to organize their lessons into different sessions with different learning activities and tasks towards specific goals, thereby creating favorable conditions to facilitate student self-regulated learning motivationally, behaviorally, cognitively and metacognitively. A fully engaged SRL lesson is one in which all the four key dimensions of self-regulation processes are effectively activated throughout the four lesson sessions with appropriate learning activities and facilitating strategies.

4 The Intervention System -- Starting Up the SRL Program in School

Now that we have the SRL lesson organization structure and the underlying self-regulation mechanism for our school-based model, our next challenge is to put them into action in school contexts. For our SRL model to have real impact on student learning in school, we must have a truly school-based intervention system in place. So the third and final step in developing our school-based model is to design an intervention system that can effectively kick off the SRL program school-wide.

Our intervention system is made up of three key elements: the instructional modes, the implementation strategy, and the self-evaluation mechanism. Together these three elements contribute to building up the capacity of the whole school in the implementation of our SRL program and cultivation of a culture of SRL among students as well as teachers.

4.1 The Instructional Modes

For our SRL model to be truly school-based, we need a differentiated repertoire of instructional modes which teachers can choose for adapting their classroom practice to the specific contexts of the school. These school-based contexts include: 1. Student differences in abilities and learning styles; 2. Teacher differences in capabilities and experiences; 3. Class differences in size and composition; and 4. Subject differences in curriculum and pedagogy.

To cater for student-, teacher-, class- and subject-specific differences, I have constructed a typology of four instructional modes based on the relative degree of emphasis of and the amount of time allocated to the four lesson sessions in a SRL lesson (see Table 3). These four modes are by no means exhaustive. Teachers can vary the relative proportion of the four lesson sessions according to the actual needs in school context. Below are some exemplary scenarios for the four instructional modes.

1. Highly teacher-directed mode (高引導式 "Gao Yin Dao Shi'):
   Teachers using the highly teacher-directed mode put more effort and time on instruction, giving students more direction and assistance in the learning process. For teachers who have little experience with SRL in the beginning stage, or teachers who are teaching difficult topics of certain subjects which require more abstract thinking, in particular to a larger or weaker class, or students developing SRL at a slower pace, they will probably prefer the highly teacher-directed mode.
2. Highly collaborative mode (高協作式 "Gao Xie Zuo Shi"):
   In a lesson which is highly collaborative, students spend more time on working together in groups. The teacher's role is to facilitate co-learning within groups as well as mutual learning between groups. For students and teachers who are sociable and active in classroom interaction, and who are working on topics of certain subjects that require a lot of discussion and debate, the highly collaborative mode will be their best choice.
3. Evenly balanced mode (平衡式 "Ping Heng Shi"):
   For the evenly balanced mode, students are given opportunity by their teachers to engage in learning activities of all the four lesson sessions and spend roughly equal amount of effort and time on them in the classroom. Teachers and students staying on this mode are usually quite used to SRL and get the most from all the four lesson components. The size and the learning differences of the class are usually not too big.
4. Highly self-regulated mode (高自主式 "Gao Zi Zhu Shi"):
   Finally, in the highly self-regulated mode, students work on their own for most of the lesson time while instruction of the teachers is kept to the minimum. For teachers who are competent in SRL, and are teaching brighter classes, or students who are confident to take challenges, topics

Table 3 A Differentiated Repertoire of SRL Instructional Modes

Lesson sessions	Highly teacher-directed mode	Highly collaborative mode	Evenly balanced mode	Highly self-regulated mode
Self-learning	Low	Low	Medium	High
Co-learning & mutual learning	Medium	High	Medium	Medium
Teacher-directed learning	High	Medium	Medium	Low

of particular subjects that encourage active construction of knowledge, they are more ready to give their students greater autonomy in classroom learning.

On the whole, the use of differentiated instructional modes is welcome by teachers as well as students. For teachers, the most important advantage of differentiated instructional modes is that they can flexibly adapt their classroom practice to school-based contexts at different stages of our SRL program. As for the students, they enjoy greater variation in lesson organization which can more effectively cater for their learning diversity in lessons of different subjects on different topics for specific grades and classes.

4.2 The Implementation Strategy

To scale up the SRL program across lessons of different classes, grade levels and subjects in the school, and to maximize the effect of SRL on students school-wide, it is essential to design an implementation strategy which can take us through the different stages of development of our school-based model, and help to build up the momentum of the program and the capacity of people concerned. Unlike the Shandong model which is essentially top down, full scale at one go with a one-size-fit-all approach, I have adopted a gradual progression strategy which involves six types of progression in the form of a three-year plan (see Table 4)

1. Progression by year:
   The SRL program is a three-year project of the school's development plan which sets out the overall timeline so that all teachers and students understand the goals, the strategy and the timeline early at the very beginning.
2. Progression by grade level:
   The program starts from Secondary 1 (S1) in the first year when primary school students enter into a new environment in a secondary school and then moves on to S2 and S3 with the same cohorts of students in the second and the third year.
3. Progression by class:
   To help students in the lower-ability classes to adapt themselves to SRL classroom practice, SRL is used in fewer subjects than the high-ability classes in the first

Table 4 A Three-Year Plan of SRL Implementation Strategy

Year	Subjects adopting SRL in 2 higher-ability classes in Secondary 1, 2, & 3 levels	Subjects adopting SRL in 2 lower-ability classes in Secondary 1, 2, & 3 levels	Total number* of teachers involved in SRL project
1	S1: Chinese language Mathematics Integrated Science Integrated Humanities	S1: Chinese language Mathematics	13 (all are first timers in implementing SRL in classroom)
2	S1: Chinese language Mathematics Integrated Science Integrated Humanities S2: Chinese language Mathematics Integrated Science Integrated Humanities	S1: Chinese language Mathematics Integrated Science Integrated Humanities S2: Chinese language Mathematics	22 (12 of them are first timers)
3	S1: Chinese language Mathematics Integrated Science Integrated Humanities S2: Chinese language Mathematics Integrated Science Integrated Humanities S3: Chinese language Mathematics Chemistry Chinese History	S1: Chinese language Mathematics Integrated Science Integrated Humanities S2: Chinese language Mathematics Integrated Science Integrated Humanities S3: Chinese language Mathematics Chemistry Chinese History	30 (10 of them are first timers)

*Among all the teachers involved in the SRL project, one is the assistant principal and the other the principal of the school.

and second years until the third year when both types of classes have the same number of SRL subjects.

4. Progression by subject
   To accumulate experience in implementing SRL in the classroom, the program focuses on a smaller number of subjects in the first and the second year, mainly the major subjects which have more lessons in the school's timetable, and then move on to the minor subjects in S3 in the third year.
5. Progression by student cohort:
   Each year the program starts with a new cohort of students in S1. The total number of cohorts having SRL in lesson moves from one group in the first year to two groups in the second year and then three groups in the third year of the program.
6. Progression by teacher group:
   To build up the capacity of teachers in SRL classroom practice subject-wide and school-wide, the program starts with a smaller number of core teachers who serve as change agents in the first year and then expands the number of teachers to implement SRL by year.

Through SRL activities such as subject and cross-subject meetings, collaborative lesson preparation and peer lesson-observation, training workshops, inter-school visits and sharing, both teachers and students have become more capable self-regulated learners.

4.3 The Self-Evaluation Mechanism

Our school-based model of SRL will not be complete without a self-evaluation mechanism. In fact, self-evaluation is such an important component of SRL on the metacognitive dimension that all practitioners must practice it in their day-to-day work. To keep track of the development of our SRL program for continual improvement, we need a self-evaluation mechanism to study the impact of SRL classroom practice on students and teachers and assess our own performance.

This self-evaluation mechanism is by no means something extra or add-on but a built-in feature of the intervention system of our school-based model. Below is a brief outline of practitioner research we conducted on a number of the key areas of our SRL program with some of the initial findings of the first and second year.

1. Peer classroom observation:
   All teachers participating in the SRL program, irrespective of the grades, classes and subjects they taught, reported that compared with traditional lessons they taught in the past for same subjects, classes and grades, they observed in their SRL lessons great enhancement in the following aspects: students' engagement; students' interest in the lesson, the subject and the teachers; students' self-confidence; peer interaction and cooperation; teacher-student interaction and relationship; students' speaking, writing and presentation opportunity and skills; and organization and thinking skills in general.
2. Subject and cross-subject meetings and collaborative lesson preparation:
   All participating teachers agreed that they had more professional dialogue and collaboration; became more experienced and confident with the use of lesson objectives, learning tasks and activities; and more capable to adapt their lesson organization and classroom strategies to student needs and other school-based contexts.
3. Interim and year-end surveys of SRL teachers:
   All participating teachers and school leaders reported that through the SRL program they now used a common language of classroom practice; strengthened mutual trust, collegiality and team spirit; felt encouraged by the improvement of students learning particularly in motivation and self-efficacy; and raised their expectation of students and confidence in the SRL program.
4. Focus groups for students:
   80 to 90% of students participating in focus groups reported they liked SRL lessons more than traditional lessons; enjoyed group work and competition for rewards; felt more confident to communicate with teachers and classmates; learnt more from other people and look at things from wider perspectives; took greater responsibility in learning and learnt faster than before.
5. Survey by student council and school committee:
   Findings were on the whole consistent with the above. About 80% of students being interviewed agreed or strongly agreed that SRL lessons had positive impact on classroom learning. Some students in the senior forms who did not have the chance to have SRL in their lessons related that they appreciated the way their junior form schoolmates learned in a SRL lesson and believed the spirit of self-regulated learning being important for all students.
6. Longitudinal survey with the support of academics:
   To study the impact of our SRL model more systematically, academics from local universities were invited as research advisers. An instrument to measure student SRL was specially designed and a pre-test and post-test had been conducted at the beginning and end of the second school year. The validity and reliability of the instrument were on the whole positively confirmed but the findings are yet to be published.

5 Summary and Implications

In this article, I have discussed the learning journey of a

Hong Kong secondary school in developing a school-based model of SRL in the classroom. In search of a pedagogy that can create positive impact on student learning, the school has delved into the frontline of pedagogical reform in Mainland China to learn from the practical experience of Shandong schools implementing SRL in their classrooms.

Among the different characteristic features of the Shandong model of SRL, the lesson organization is particularly appealing to Hong Kong teachers. The Shandong model shows its practical wisdom of embedding SRL in everyday lessons with a highly structured and operationalized organization pattern. Based on well-defined fundamental guiding principles, the SRL lesson is divided into different lesson sessions accompanied by different learning activities to help student develop positive learning habit, disposition and capability in SRL.

Useful as it is, the Shandong model, however, has its own limitations. The tendency towards a standard pattern and procedure may lead to the danger of over-routinization of classroom practice. A more serious problem is the lack of a solid base of theory and research. Practitioners may have to depend on personal intuition more than knowledge. So it is important for us to guard against such pitfalls, and to reconstruct the Shandong model of lesson organization with a broader perspective and flexibility.

To help our teachers acquire a deeper understanding of SRL to inform their classroom practice, we have conducted a comprehensive literature review of international SRL theory and research. By connecting theory and research to classroom practice, we are able to analyze the different types of self-regulation processes and facilitating strategies and to construct a holistic framework of SRL lesson in which the relationships between these self-regulation processes and facilitating strategies with the lesson sessions and the learning activities are clearly spelt out.

If the first and second steps of our model development are about reconstruction of practice and knowledge, the focus of our third step is adaptation of the model to school contexts. In order that our model of SRL can become truly school-based and effectively implemented across-the-board in the school, I have developed a differentiated repertoire of instructional modes to cater for individual, teachers, class and subject differences. Teachers can vary the relative proportion of the different lesson sessions and related learning activities to suit the needs in context. In addition to the differentiated instructional modes, an implementation strategy and a self-evaluation mechanism are included in our school-based model to ensure successful startup and continued improvement of our SRL program school-wide.

In retrospect, our school-based model of SRL in the classroom has opened some new directions or lines of thoughts for the future development of SRL. For a long period of time, the paradigm of SRL has predominantly based on Western theorizing and research (McInerney, 2008, 2011). While numerous academic papers with important models, concepts and findings have been published, no coherent instructional framework of SRL in the classroom, except individual techniques and strategies for promoting SRL, has so far been developed (Goetz et al., 2013; Paris, 2004). Our introduction and reconstruction of the Shandong classroom-based model of SRL, with its elaborated patterns of lesson sessions and learning activities, has in fact echoed Boekaerts' view on the importance of finding a pedagogy to support SRL "in the structure of the classroom" (Baumfield, 2004; Boekaerts, 2002), and has shed light into this issue for further exploration.

Another area of academic interest is the integration of practice with theory and research. As we have pointed out, the Shandong model of SRL is typically Chinese in its emphasis on practical application over abstract theorizing and systematic research which has its root in traditional Chinese culture. By reconstructing the Shandong model in practice and linking it to international SRL theory and research, we have demonstrated an endeavour by a researched-engaged school (Dimmock, 2013) in bridging the western paradigm and the Chinese model and the theory-research-policy-practice divide, a divide raised by Dimmock, Fullan, Hargreaves and others (Dimmock, 2012, 2013; Fullan, Hill, & Crevola, 2006; Hargreaves, 2000; Centre for Educational Research and Innovation, 2000, 2007).

Finally, the use of a differentiated repertoire of instructional modes in our model to adapt to the learning contexts has raised the important issue of the complex relationships among students, teachers, classes, subjects and SRL in the classroom. About ten years ago, Archer once discussed the difference between what she called "the productive SRL" and "the counterproductive SRL" and supported with research findings her warnings that "too little SRL" and "too much SRL" may both be counterproductive to student learning. In her view, only the right SRL pedagogy that caters for the needs of the students in context is "productive" (Archer, 2004). The discussion on the four different instructional modes, as suggested by our school-based model of SRL, particularly the "highly teacher-directed mode" and the "highly self-regulated mode" might give us the key to this long neglected issue. It is high time school practitioners rethought and reinvented their classroom practice in order to help all students become more capable self-regulated learners in the 21st century.

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Literacy Choice with Externality: Some Evidences from India

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Abstract

Numerous studies exist on the impact of education on the several socio economic choices made by the individual as well as the families. It is generally argued that the improvement in literacy raises the income prospect of the individuals. It raises the health awareness and has a positive impact on the life expectancy and the reduction of morbidity and mortality. Instances are many. However there is a reverse causation. The actual educational attainment of a family (including the literacy rate) should itself depend on the other socio economic features of the family. This paper tries to discuss the causation with respect to the literacy rate. For this we take a new view of literacy as postulated by Basu and Foster (1998). Literacy improves the welfare not only the literate but also those who are close proximity with him or her. Using the NSSO 64th round data we try to find out the impact of various socio economic variables as the family literacy rate. The analysis find supportive evidence that the level of family literacy is directly related with family assets, income and other economic variables. Education level of household head is also a major stimulating factor. In all, it is the poor families who have low family literacy rate and even isolated illiterates. Economic empowerment is the key to bias the family decision in favour of more of its member literates.

Keywords: externality, literacy, human capital, tobit

1 Introduction

Human capital decisions are crucial for families. Family decision about the endowment of human capital to its members at their early age decides the productivity and income earning opportunities not only to its members alone but also to the whole family in some future time period. Lots of studies have been made with this issue over the years.

Becker (1974) in his theory of social interaction and later in another work jointly with Tomes (Becker & Tomes, 1976) has developed the wealth model incorporating the human capital investment decision within the sphere of the household. The crux of this wealth model is that wealthy and altruist parents provide rational and optimum level of education to all of its children. Later on Behrman, Pollak, and Toubman (1982), Mcgary and Schoeni (1995), Altonji, Hayashi, and Kotlikoff (1992) and in lots of other works this altruistic principle of the parents have been modified and extended over the years. Sometimes basic household characteristics such as income, level of parental education (Becker, 1974) determine the schooling decision of the children.

From the broad view of human capital formation, in this paper we move to a more mundane case-the causes and determinants behind acquisition of very basic literacy. Generally literacy refers to a minimal functional requirement of the ability to decode simple written or printed documents that requires only minimal skill[1] acquisition. Long ago the Indian Nobel Laureate poet Rabindranath Tagore opined that only basic ability to read should transform the life of a people steeped in ignorance and poverty. In many developed countries, this is a basic human right of a child. It is enshrined in the Millennium Development Goals. However the picture is dismal for most poor countries. In India, the Right to Education has been recently enshrined in our Constitution. Still, much is left of its implementation. Literacy acquisition is not always related to the broader objectives of return to human capital. An aged person becoming literate will not bestow any quantifiable monetary return to himself/herself and his/her family. For a poor family in the underdeveloped country, however, acquisition of this basic skill requires a cost-the cost of the foregone income that the times spend on literacy acquisition invokes. In a sense, then the problem of literacy acquisition is closely related to the incidence of poverty.

However when poor people become acquainted of the fruits of basic literacy, they may somehow try to bear this cost. However literacy brings externality. The basic

[1] In many developed countries, this may be designated in the bracket of basic life saving skills such as standing upright, walking or speech. However Lucas (2003) treated such basic skills within the ambit of human capital. "Human capital is a broad term, encompassing cognitive achievements that range from basic scientific discoveries to a child's learning how to read or how to plough behind a horse" (Lucas, 2003).

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functions of decoding may be acquired by family members who are literate and transmitted to their illiterate co-members. Thus it may not be worthwhile for a poor family to put effort in making all its members literate. The family may choose members on whom it will spend its limited resources. The apathy to make people literate may lie not so much in its cost but rather on the externality that literacy produces. Like many goods of positive externality, it is under produced.

This concept of externality has been first introduced by Basu and Foster (1998) (hence after BF). They have opened up the dynamics of literacy analysis. The argument is that this spread of literacy may be unequally divided even within a family. However it is better to have at least one member literate (proximate illiteracy) within a family than to have none. Numerous studies have developed the basic idea of Basu and Foster (1998) showing on the facets of literacy achievements and their inputs. Literacy sharing or spreading within the household is thus one of the important issues that the parents or household head have to decide carefully.

However Subramanian (2004) brought out an important flaw in the Basu and Foster (1998) specification of effective literacy. In their approach the measure of effective literacy is simply $E = R + \propto P$ where R is the standard Literacy rate and P-the proportion of proximate illiterates. Since the measure adds up to the common literacy rate, it may give a distorted picture (or a false solace to the policy makers). Subramanian corrects this aberration by imposing fine on isolated illiterates to make the measure $E^S = R - \propto I$, where I is the fraction of isolated illiterates. To force it between zero and unity , he takes $\propto = R$ so that we get $E^S = R(1 - I)$.

The nature of externality is crucial. Many commentators supposed it to be independent on the number of literates. Consequently, the greater the family literacy rate, the lower would be the marginal benefit of adding an extra family member into the literacy bracket. This is simply because such extension lowers the number of illiterate family members.

Still another relation is possible. It may be argued that externality in literacy is a family variable. Hence it does not matter whether one or more of the members become literate. In this case the externality rises from a zero level (isolated illiterate family) to a high level when one of its members becomes literate. The value stays at that level until everybody in the family becomes literate (fully literate). In effect thus it attains two values -- zero (for isolated illiterate and full literate families) and a high constant value for all other level of family literacy. With full literacy, the externality effect falls to zero. In both these cases, the externality is positive only when atleast one member is literate but not when all are literates[2].

However, an alternative formulation is possible (Sengupta & Mukherjee 2013; Sengupta, Sengupta, & Ghosh 2008). The logic is simply that literacy externality may be a reasoned decision making process rather than a mere dissipation of some given stock of knowledge. A single member may wrongfully decode that his/her co-member will correct. There can be variation in view regarding decoded information that can be settled only through discussion and debate within the family. Like all public opinion making, it would be fruitful if the family has a larger number of literate persons than otherwise. The common argument is that decisions involving a larger number of informed persons are always better than few. Hence its dimension rises with the proportion of literate family members[3]. It is a monotonic function of the number of literates with the highest value attained when all but the members in the family are fully literate. In both cases, the situation changes radically. Here externality effect rises with the expansion of family literacy.

Thus there is a debate regarding the externality effect of literacy-whether it is an individual effect or an effect of group decision making process within the family. We may term the external effects as E^I and E^G with the condition $E^G \leq E^S$. We may now posit the debate in a different way. The externality of literacy can be regarded as subjective rather than objective. The family's evaluation about externality may be regarded as $U(E)$ such that $U(E) \in (E^G, E^S)$. Undoubtedly if $U(E)$ tends towards E^S, family literacy rate will rise and vice-versa. It can now be argued that this evaluation function depends on a lot of demographic, social and economic factors. The task of an empirical economist is to ascertain the strength of the factors that determine the spate of $U(E)$ and hence the determinants of literacy attainment.

In this paper we try to explore the ongoing debate of literacy attainment choice decision of the household from this externality point of view. By using NSSO unit level data (Published by Ministry of Statistics and Programme Implementation Government of India, 2010) we have done

[2] In fact Basu and Lee (2008) stated this explicitly in their "strong normalisation axiom." To quote explicitly from them -- "The second part is what makes it 'strong.' Most standard measures of literacy (Basu and Foster [2], Dutta [6], and Gibson [7] for instance) do not satisfy this; the only exception is Subramanian [14]. What this part of the axiom says is that, if there are no isolated illiterates in a society, then the literacy of that society is equal to the standard literacy rate. This, coupled with the next axiom, means that our measure of literacy will always be less than or equal to the literacy rate." -- (Basu & Lee, 2008, p. 8).

[3] In fact Subramanian (2004) has pointed out that the Basu and Foster (1998) paper also endorsed such a possibility.

rigorous and extensive analysis regarding this issue for each and every state of India separately.

This paper is divided as follows. Section 2 gives us a justification of logical structure of this paper. The basic data structure is given in Section 3 while the main analysis is given in Section 4. Some concluding remarks are given in the last section.

2 The Methodological Issues and the Estimation Procedure

To analyse the apparent paradox of educational heterogeneity across the households, we have used the Tobit regression technique. The Tobit model (proposed by James Tobin, 1958) shows the relationship between a non negative dependent variable Y_i and an independent variable or vector X_i. Tobit model assumes that there is a latent variable Y* which depends linearly on X_i through a parameter vector β. Suppose that Y^*_i is observed only when $Y_i^* > 0$ and otherwise if $Y_i^* \leq 0$. Then the structural equation for the observed Y^*_i (known as Type1 Tobit) can be defined as

$$Y_i = \begin{pmatrix} Y_*^i = \beta Xi + Ui \; if \; Yi^* > 0 \\ 0 \; if \; Y^*i \leq 0 \end{pmatrix} \quad U_i \sim IIDN(0,\sigma^2).$$

This model is also known as censored regression model since some observation of the dependent variable Yi* (for $Yi^* \leq 0$) are censored. According to Wooldbridge (2002), censored regression are of two types, namely, 1. Censored regression application and; 2. Corner solution model. In the first type, the censor regression model is designed to estimate the variables when there is either left or right censoring in the dependent variables. Censoring from above takes place when in some cases there exist some values which areat or above the pre-specified threshold limit. In these cases the true value might be equal to, or higher than, the threshold limit. For the values below the threshold limit, below censoring procedure is appropriate. Ordinary least square technique for the estimation of the dependent variable in thesecases produce downward bias (Green, 1997).

In the second type, the dependent variable y is not censored. Here y as observable choice takes on the value 0 and it is a continuous random variable over strictly positive values. For this type, agent's optimum choice will be the corner solution. Here the issue is not the data observability or censoring rather than finding out the distributional aspect of the dependent variable y. According to Woolbdrige (2002), like in the first type, ordinary least square is not an appropriate technique to use in this setting either.

Our work is more closely associated with the application of the second type of Tobit model, known as Corner Solution model. As we have explained earlier, households are classified into three groups according to their spreading of literacy within the household. The most superior households in terms of households' level of literacy are those who possess the highest literacy rate within the household, i.e., where all members of the family are literate. The moderate literate households or proximate households are those where at least one family member is literate. The worst families which Basu and Foster (1998) termed as "isolate" are those where all the household members have been denied from the access of literacy.

In our analysis using theTobit model, we have used the family literacy rate as the dependent variable which takes the value 0 for the isolated illiterate household and 1 for the full literates. In between the two the significance of the proximate illiterate households is being verified. In other words, our threshold limit is zero for the isolate illiterate households. As the literacy rate increases within the households the values of dependent variables tends to the upper maximum level of 1. Our analysis is not constrained with data observability. Rather, the null value in the dependent variable comes strictly from the household choice regarding their educational pattern. Our estimation is based on the following Tobit equation:

$$Y_{ij} = \beta \sum X_{k,ij} + U_i$$

Where Y_{ij} is the dependent variable describing the character of the family, X_k are the vector of explanatory variables, β is the estimated slope coefficient, i is number of households (= 1,.....,n) and j is the household types (= 1, ...3).

3 Data Description

In this paper we have used National Sample Survey Organisation's 64th round unit level data published in May 2010 by the Ministry of Statistics and program implementation of the government of India. In this short data descriptive part we have at first shown the state wise ranking of the full literate, proximate illiterate and isolated illiterate households (shown in Table 1 in the appendix A1) along with the actual literacy rankings. The number of full literate family is highest in Marjoram followed by Kerala, Meghalaya and others. These three states also holds the top three positions if we take into account the actual literacy ranking. The number of isolate and proximate families is minimum in the literacy advanced states and is on the higher side in the low literate states. For example Bihar take the first position in the ranking of isolate illiterate family and it's ranking in the actual literacy rate is the last. Similarly, Rajasthan takes the last position in the raking

Table 1 State-wise Family Literacy Ranking

Dependent Variable	Family literacy rate
Independent Variables	Sector (higher value is assigned with urban areas) Sex of the household head (females given greater value). Age of the household head. Religion (Higher value is assigned for minority religious community) Social Group (Higher value is assigned for general caste community) Household size. Distance of primary schools. Distance of upper primary schools. Distance of secondary schools. Land Holdings (Greater values are the indication of more land holding capacity of the households) Monthly consumption expenditure. Household type
No of Regressions	26

of full literate family but its ranking is highest among the proximate illiterate rankings. The literacy rate of some states is high simply because most of the family members in these states are highly educated and literate. This in turn not only improves the overall literacy rankings of these states but also can bring them to top positions in the full literate ranking table. This table clearly demonstrates that government should have to take some policy initiatives that not only can bring more isolated families in the light of literacy but also can spread literacy among the proximate illiterates so that the targeted growth rate in literacy can be fulfilled in short duration.

In the second table we shown the literacy distribution within the households across the various states of India. This table exhibits percentage of full literate and isolate families along with the degree of proximity within the households. From this table it is seen that families with high proximity rate (is highest in Rajasthan. In this state the percentage of full literate households is on the lower side (only 22.48% families belonging to the full literate category). On the other hand in Marjoram the percentage of higher proximity is minimum since majority of the families (more than 91%) are fully literate. Again in Bihar more than 22% of the families are fall in the category of isolated illiterate families. Only 25% of the families are fully literate. The percentage of high proximity is also very low in this state.

4 Analytics of Literacy

4.1 Parameter Specifications

As noted earlier, the dependent variable we huse is the family literacy rate. It can take three types of values -- one if full literates, zero if isolated illiterate and between zero and unity if proximate illiterate. Thus this variable tends to capture the effect of externality based literacy rate. In the Tobit regression analysis we incorporate 12 independent variables. We classify these variables into three broad headings -- social variables, institutional variables and the economic variables. Households' basic characteristics such as age and sex of the family head, their religion, castes, and sector are grouped under the heading of social variable. These are some of the factors that can jointly and/or independently have an influence on the children's level and standard of learning.

Institution or government can play an important role in promoting educational campaign across the households. Availabilities of educational institutions nearest to the place of living of the households are supposed to create a substantial impact on the choice of the educational investment decision of the families. It certainly affects the access of education and the attendance rate of the children in the schools. In our analysis we have taken into consideration this issue and have used the distance parameter (distance of primary, upper primary and secondary schools) under the heading of institutional variable to assess its impact on family decision on education.

Household's assets, consumption expenditure and working status are some of the good indicators of their living standard and wealth. Lack of enough resources among the poorest of the poor families sometimes has restricted the investment choice decision of the families on education. In our analysis the availability of land is used to describe the role of asset on the level of literacy. Consumption expenditure can be used as a proxy of family income which have a direct impact on level and standard of education. Working status of the family head and other members also plays a crucial role on the family literacy rate. All of these characteristics of the families are clubbed together under the category of economic variable in our

regression analysis. The detail breaks up and weights of these variables are given in the following table.

We now see how far our data support these conjectures.

4.2 Regression Results

The state specific Tobit regression result is given in the appendix. From these findings it can be seen that among the social variables importance of sector on the level of literacy is enormous. Households in the urban areas are substantially more equipped with better facilities and opportunities compared to their rural counterpart. Urban parents are more aware of their sibling's educational matter than the rural parents. It may be because the majority of rural parents are illiterate and their children are the first generation learners. So it is not possible for these illiterate parents to know the importance of education on their wellbeing. Lower income earning opportunities as well as shortage of quality and easy accessibility of greater number of educational institution are supposed to constrain the steady flow of literacy in the rural areas. In our analysis it is seen that in all states in India, sector has a significant impact on literacy rate of the households. The urban families are endowed with the greater family literacy rate and full literate families are more common in the urban areas. The spreading of literacy among the members of the families is not equitable in the rural areas. The disease of isolated illiteracy is still a major cause of concern in the rural areas.

Next we consider the sex of the family head. India is known to be a male dominated country. Gender disparity in various sphere of life is still a major cause of concern in this country. This phenomenon is clearly manifested in our regression analysis. Family literacy rate in the female headed households is quite worst in all parts of India (except in Tripura, Nagaland, Orissa, Mizoram and Aurunachal Pradesh where female headed households are positively significant with family literacy rate). Social and economic factors associated with these female headed families have forced their literacy rate to fall in the downward direction.

Religion and caste are two other important social dimensions which should also be taken into consideration for making the determination of family literacy rate. India is a multi-cultural country and all types of community are living together here. In terms of community, Hindus are the majority followed by Muslim, Christian and others. The percentage of different communities varies substantially in different states of India. In our analysis in most of the states, family literacy rate of the minority communities are comparatively lower than that of the majority section of population (except in Jharkhand & Tamil Nadu religion significant positively with the dependent variable). Despite huge literacy enhancement programs particularly for these minority communities, it fails to take a substantial impact on their level of literacy. Sometimes social norms and family ethics of these minority communities have forced them to remain in the pocket of illiteracy.

Like religion, caste differentiation also is a major of cause of concern in India. From the regression analysis it can be seen that in most of the states of India (except in Meghalaya, Mizoram, & Nagaland), social group has a positive significant impact on the family literacy rate. Educational endowment among the general caste is on the higher side compared to the socially unprivileged section of population. Lower sections of population in India are still fighting hard for their subsistence level of living. Many educational enhancement programs of Indian government such as setting up of educational institutions in the tribal and hill areas, introduction of different scholarship facilities in various age groups and level of learning for this lower section of population are not suitable enough to bring the equitable sharing of literacy. Subsistence income sometimes forces them to take the decision of small and negligible human capital investment decision.

Next comes to the institutional variables. Distance of institution from the place of residence of the households is another factor that could have an impact on household's educational decision making process. In our analysis in most situation distance variable have a negative impact on the dependent variable. Distance of institution place a huge burden on the children to take part in the educational system for a longer period of time. This is particularly more severe for the female children since distance discourages the parents to enrol them in the schools. In the regression analysis the distance parameters have a negative impact on the dependent variable. Greater distance from the place of residence particularly in the primary section has increased the probability of isolated illiteracy in the households. The direct and opportunity cost of education are so high that the parents are very reluctant to send their children in the away schools.

Now let us move to the economic factors. In this case the extent of family literacy is mixed. For most of the states there has been a positive relation between land possession and family literacy. If we take land possession as an indicator of family wealth then this is what is expected. A richer family generally invest more on human capital formation per capita. Consequently the family literacy rate will improve. An exceptional case is West Bengal where the relation becomes negative. A reason may be that due to land reform a ceiling has been imposed on the upper limit of land possession. As a consequence, the resources have been shifted from land to non-land items. It is those who have not been be able to do so are left behind. Generally they are weaker in terms of other assets and are reflected by

the perverse relation.

The positive relation with the per capita consumption expenditure is also expected. As household consumption expenditure is escalated more should be allocated to the educational items tool.

The household type is indexed in an ascending order with permanent employees at the top and the casual worker at the bottom. The relationship with family literacy is positive whenever significant. The stability in income sources is an important factor towards escalating human capital expenditure.

5 Conclusion

Traversing the long torturous path, it becomes clear to us that the effect of educational externality of literacy choice cannot be determined apriori. Theoretically literacy externality lies between two extreme values -- low value when it is assumed to be individualistic and a high one if it is a group decision. Literacy acquisition depends on the family's assessment on this externality. The relationship is mediated through the prism of a host of socio economic factors (such as caste, religion and others). The influence of institutional factors also cannot be neglected. Nearness to the educational institution often acts as an additional incentive towards expansion of family literacy. It is in this light that the debate of the nature of educational externality has to be finally settled.

This paper tries to discuss the causation with respect to the literacy rate. For this we take a new view of literacy as postulated by Basu and Foster (1998). Literacy improves the welfare not only the literate but also those who are close proximity with him or her. Using the NSSO 64th round data we are tries to find out the impact of various socio economic variables as the family literacy rate. It is verified that the level of family literacy is directly related with family assets, income and other economic variables. Education level of household head is also a major stimulating factor. In all, it is the poor families who have low family literacy rate and even isolated illiterates. Economic empowerment is the key to bias the family decision in favour of more of its member literates.

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Appendix

(all the tables are based on NSSO 64th round unit level data with own calculation and modifications)

Table A1 State Wise Literacy Family Ranking

States	Ranking full literate family	Ranking of isolate family	Ranking of Proximate family	Ranking Actual literacy
Andaman & Nicober	11	30	23	8
Andhra Pradesh	30	5	7	31
Aorunachal Pradesh	18	10	22	26
Assam	10	23	27	10
Bihar	34	1	5	35
Chandigar	6	20	31	9
Chattisgarh	27	9	8	25
Dadra, Nagar, Haveli	21	25	13	19
Daman & Diu	4	28	32	5
Delhi	9	26	29	11
Goa	12	27	25	12
Gujrat	24	15	12	23
Hariyana	29	14	4	24
Himachal Pradesh	19	18	16	17
Jammu & Kasmir	32	8	3	30
Jharkhand	31	2	11	33
Karnataka	25	12	9	27
Kerala	2	31	34	2
Lakshadip	7	35	28	6
Madhaya Pradesh	28	6	6	28
Maharastra	14	21	20	14
Meghalaya	3	33	33	3
Mizoram	1	34	35	1
Momipur	17	24	18	16
Nagaland	5	32	30	4
Orissa	26	7	10	29
Pondichari	8	29	26	7
Punjab	22	16	14	20
Rajasthan	35	3	1	34
Sikkim	13	22	24	13
Tamil Nadu	15	17	21	15
Tripura	16	19	19	18
Uttar Pradesh	33	4	2	32
Uttaranchal	23	11	15	22
West Bengal	20	13	17	21

Table A2 Distribution of Family Literacy

States	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.89	0.99	1
Andaman & Nicober	1.89	0.00	0.00	0.47	2.13	4.73	4.02	8.27	12.29	2.84	0.47	63.12
Andhra Pradesh	14.98	0.00	0.85	2.19	8.46	15.72	4.06	7.79	9.30	1.36	0.07	35.22
Aorunachal Pradesh	10.72	0.00	1.33	1.95	5.05	10.98	3.72	5.05	7.44	2.13	0.09	51.55
Assam	5.51	0.00	0.08	0.86	2.55	6.17	2.18	5.10	8.18	4.28	0.21	64.88
Bihar	22.51	0.03	2.08	3.07	8.43	14.02	3.56	7.34	9.90	3.84	0.14	25.07
Chandigar	5.93	0.00	0.59	0.89	0.89	4.45	1.19	4.75	5.93	2.97	0.00	72.40
Chattisgarh	10.84	0.00	0.63	2.14	5.47	11.42	4.38	7.82	13.56	3.60	0.42	39.73
Dadra, Nagar, Haveli	4.30	0.00	1.17	0.39	5.08	12.11	3.13	7.81	10.94	6.25	0.39	48.44
Daman & Diu	3.52	0.00	0.00	0.00	0.78	3.13	1.17	3.13	7.81	3.52	0.00	76.95
Delhi	4.04	0.00	0.17	0.50	1.60	8.24	2.27	4.54	10.34	4.54	0.25	66.86
Goa	3.85	0.00	0.35	0.70	2.45	4.90	3.85	3.85	15.03	3.15	0.00	61.89
Gujrat	7.61	0.05	0.73	1.94	5.02	10.03	3.93	7.68	13.09	5.28	0.24	44.40
Hariyana	7.80	0.00	1.10	1.20	4.45	12.24	5.44	8.63	15.86	5.70	0.31	37.26
Himachal Pradesh	6.55	0.00	0.28	0.39	2.52	9.12	3.92	8.67	14.33	4.20	0.06	49.97
Jammu & Kasmir	11.41	0.00	1.65	3.06	7.17	12.58	5.47	10.05	12.58	4.88	0.24	30.92
Jharkhand	17.70	0.00	1.98	2.07	6.89	12.52	3.77	7.29	10.37	3.28	0.12	34.02
Karnataka	8.87	0.00	1.26	1.84	6.17	10.75	4.67	8.53	11.87	3.79	0.10	42.15
Kerala	1.88	0.00	0.04	0.07	0.50	2.88	0.57	3.45	6.18	2.20	0.21	82.02
Lakshadip	0.52	0.52	0.00	0.52	1.04	4.69	0.52	5.21	6.77	7.81	2.08	70.31
Madhaya Pradesh	12.05	0.00	0.85	1.73	5.76	12.20	4.90	7.72	11.91	4.72	0.25	37.91
Maharastra	5.91	0.00	0.52	0.48	3.39	8.10	2.88	6.88	11.51	4.37	0.26	55.70
Meghalaya	1.49	0.00	0.07	0.14	0.85	2.91	1.07	3.98	5.47	2.84	0.07	81.11
Mizoram	0.70	0.00	0.08	0.08	0.47	1.25	0.31	1.56	2.58	1.41	0.00	91.56
Momipur	5.21	0.04	0.52	0.78	3.17	9.47	3.26	7.04	11.42	4.52	0.09	54.47
Nagaland	1.78	0.00	0.07	0.00	1.07	2.49	1.28	3.27	7.60	5.75	0.21	76.49
Orissa	11.71	0.00	1.26	2.41	6.66	11.44	4.01	7.51	11.10	3.86	0.22	39.83
Pondichari	2.90	0.00	0.00	0.45	1.34	5.13	1.12	4.46	15.63	1.34	0.22	67.41
Punjab	7.54	0.00	0.78	1.21	3.75	9.42	5.59	6.49	12.39	5.98	0.31	46.54
Rajasthan	15.43	0.02	1.86	3.31	9.17	15.99	5.83	9.26	11.98	4.45	0.23	22.48
Sikkim	5.65	0.00	0.00	0.26	2.35	7.48	3.04	6.61	11.39	3.39	0.09	59.74
Tamil Nadu	6.81	0.00	0.16	0.58	3.67	10.31	2.70	7.12	11.07	2.12	0.07	55.39
Tripura	6.05	0.00	0.48	0.83	4.61	9.44	3.57	7.22	10.79	2.44	0.04	54.53
Uttar Pradesh	15.21	0.02	1.67	2.36	7.58	15.09	5.01	9.04	11.97	6.04	0.35	25.67
Uttaranchal	9.21	0.08	0.60	1.06	2.79	9.74	4.00	8.99	13.22	4.91	0.08	45.32
West Bengal	8.03	0.01	0.57	1.54	5.34	10.98	3.42	7.65	9.87	2.93	0.11	49.53

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy

Variables		Signf + ve	Signf -ve	Insignif
Variables				
Social Variables	Sector	AP, AS, AR, BIH, CHAT, HAR, HIM, JHAR, J & K, KAR, KER, MEGH, MIJO, MP, MANI, OR, NAG, PU, RAJ, TN, UT, UP, WB		GUJ, MAH, TR
	Sex of the head	GUJ, MAH, MIJO, OR, NAG, TR	AP, AS, AR, BIH, CHAT, HIM, JHAR, J & K, KAR, KER, MEGH, MP, MANI, RAJ, TN, UT, WB	HAR, PU, UP
	Age of HH head	OR, PU, TR	AP, AS, AR, BIH, CHAT, HAR, GUJ, HIM, JHAR, KAR, KER, MAH, MEGH, MIJO, MP, MANI, NAG, RAJ, TN, UT, UP, WB	J & K
	Religion	CHAT, HIM, JHAR, TN	AP, AS, AR, HAR, GUJ, KER, MEGH, MIJO, RAJ, TR, UT, UP, WB	BIH, J & K, KAR, MAH, MP, MANI, OR, NAG, PU
	Social Group	AP, CHAT, HAR, HIM, JHAR, J & K, KAR, KER, MAH, MP, OR, TN, UT, UP, WB	MEGH, MIJO, NAG	AS, AR, BIH, GUJ, MANI, PU, RAJ, TR
	HH Size	AP, BIH, CHAT, GUJ, HIM, KER, MAH, MP, TN, UP, WB	J & K, MEGH, MIJO, PU	AS, AR, HAR, JHAR, KAR, MANI, OR, NAG, RAJ, TR, UT
Institutional Variable	Distance Primary	CHAT, KAR, TN, TR, UT, UP	BIH, HAR, J & K, MIJO, WB	AP, AS, AR, GUJ, HIM, JHAR, KER, MAH, MEGH, MIJO, MP, MANI, OR, NAG, PU, RAJ
	Distance Upper Primary	KAR, PU, TR, UT	AP, CHAT, JHAR, MAH, MEGH, MIJO, OR, NAG, RAJ, TN, UP, WB	AS, AR, BIH, HAR, GUJ, HIM, J & K, KAR, KER, MP, MANI
	Distance Secondary	AP, AR, BIH, HAR, MEGH, MANI, PU, TR, UT, WB	J & K, KER, MAH, OR, RAJ, TN	AS, CHAT, GUJ, HIM, JHAR, KAR, MIJO, MP, NAG, UP
Economic Variables	Asset (Land)	AP , AS, HIM, JHAR, KAR, KER, MAH, MEGH, MP, NAG, TN, UT	GUJ, WB	AR, BIH, CHAT, HAR, J & K, MIJO, MANI, OR, PU, RAJ, TR, UP
	Consumption Expenditure	AP.AS, CHAT, HAR, HIM, JHAR, J & K, KAR, MAH, MEGH, MIJO, MP, MANI, OR, NAG, RAJ, TN, TR, UT, UP, WB		AR, BIH, GUJ, KER, PU
	HH Type	AP, BIH, CHAT, GUJ, JHAR, KAR, MAH, MP, OR, TN, UP	AR, HIM, NAG, PU	AS, HAR, J & K, KER, MEGH, MIJO, MANI, RAJ, TR, UT, WB

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Andhra Pradesh (N = 6,963)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.40	0.03	10.43*
	Sex of the head	-0.19	0.03	-5.15*
	Age of HH head	-0.02	0.09	-28.32*
	Religion	-0.06	0.02	-2.35*
	Social Group	0.06	0.04	13.74*
	HH Size	0.05	0.07	7.13*
Institutional Variable	Distance Primary	-0.03	0.08	-0.37
	Distance Upper Primary	-0.07	0.01	-5.08*
	Distance Secondary	0.01	0.09	2.11**
Economic Variables	Asset (Land)	0.02	0.07	3.55*
	Consumption Expenditure	0.09	0.05	17.78*
	HH Type	0.03	0.01	2.49*
Constant		1.9	0.12	15.54

Log-Likelihood Function = -3,190.40.
Mean-Square Error = 0.08.

Assam (N = 2,432)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.55	0.06	8.30*
	Sex of the head	-0.41	0.07	-5.62*
	Age of HH head	-0.64	0.01	-3.65*
	Religion	-0.32	0.03	-8.41*
	Social Group	-0.67	0.06	-1.04
	HH Size	-0.01	0.01	-1.41
Institutional Variable	Distance Primary	0.01	0.05	0.2
	Distance Upper Primary	-0.01	0.02	-0.36
	Distance Secondary	-0.03	0.02	-1.35
Economic Variables	Asset (Land)	0.12	0.01	7.53*
	Consumption Expenditure	0.06	0.09	6.77*
	HH Type	-0.03	0.02	-1.4
Constant		3.15	0.18	17.1

Log-Likelihood Function= -411.59.
Mean-Square Error = 0.62 (*significant at 1% level; ** significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Arunachal Pradesh (N= 1,059)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.63	0.07	8.55*
	Sex of the head	-0.23	0.1	-2.17**
	Age of HH head	-0.02	-0.29	-8.57*
	Religion	-0.02	0.11	-2.47**
	Social Group	0.03	0.1	0.33
	HH Size	0.01	0.01	0.55
Institutional Variable	Distance Primary	0.07	0.05	1.41
	Distance Upper Primary	0.05	0.05	1.1
	Distance Secondary	0.01	0.04	2.66**
Economic Variables	Asset (Land)	0.07	0.01	0.62
	Consumption Expenditure	0.07	0.01	4.34*
	HH Type	-0.08	0.33	-2.57**
Constant		2.51	0.22	11.02

Log-Likelihood Function = -462.15.
Mean-Square Error = 0.93.

Bihar (N = 6,983)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.46	0.03	13.03*
	Sex of the head	-0.46	0.43	-10.75*
	Age of HH head	-0.1	0.09	-1.67***
	Religion	-0.02	0.03	-0.83
	Social Group	-0.02	0.05	-0.41
	HH Size	0.03	0.06	5.78*
Institutional Variable	Distance Primary	-0.01	0.05	-2.16**
	Distance Upper Primary	0.05	0.01	0.36
	Distance Secondary	0.02	0.09	2.44**
Economic Variables	Asset (Land)	0.08	0.09	0.09
	Consumption Expenditure	-0.08	0.7	-0.1
	HH Type	0.02	0.01	1.77**
Constant		0.93	0.09	10.24

Log-Likelihood Function = -5,014.84.
Mean-Square Error = 0.12 (*significant at 1% level; **significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)Table A3 Tobit Analysis (countided)

Chattisgarh (N = 1,911)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.11	0.07	1.44***
	Sex of the head	-0.34	0.08	-4.29*
	Age of HH head	-0.02	0.01	-14.64*
	Religion	0.1	0.04	2.19**
	Social Group	0.07	0.01	6.67*
	HH Size	0.09	0.01	7.38*
IInstitutional Variable	Distance Primary	0.07	0.03	1.95**
	Distance Upper Primary	-0.07	0.02	-3.18*
	Distance Secondary	-0.01	0.01	-0.96
Economic Variables	Asset (Land)	-0.07	0.01	-0.49
	Consumption Expenditure	0.07	0.01	6.13*
	HH Type	0.19	0.02	7.47*
Constant		2.46	0.18	13.54
Log-Likelihood Function = -658.25.				
Mean-Square Error = 0.77.				
Haryana (N = 1,911)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.4	0.06	5.86*
	Sex of the head	-0.09	0.09	-1.1
	Age of HH head	-0.01	0.01	-7.98*
	Religion	-0.04	0.03	-1.37***
	Social Group	0.07	0.08	9.28*
	HH Size	0.01	0.01	1.24
Institutional Variable	Distance Primary	-0.19	0.1	-1.86**
	Distance Upper Primary	-0.05	0.05	-1.02
	Distance Secondary	0.05	0.02	2.23**
Economic Variables	Asset (Land)	0.01	0.01	0.95
	Consumption Expenditure	0.07	0.08	8.92*
	HH Type	0.07	0.02	0.26
Constant		1.97	0.19	10.24

Log-Likelihood Function = -508.67.
Mean-Square Error = 0.71 (*significant at 1% level; **significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Gujrat (N = 4,126)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	2.5	0.14	16.82
	Sex of the head	0.29	0.05	5.74*
	Age of HH head	-0.24	0.05	-4.13*
	Religion	-0.01	0.01	-10.17*
	Social Group	-0.02	0.03	-0.71
	HH Size	0.06	0.05	11.21*
Institutional Variable	Distance Primary	0.07	0.08	0.89
	Distance Upper Primary	-0.05	0.07	-0.66
	Distance Secondary	0.01	0.01	-0.62
Economic Variables	Asset (Land)	0.09	0.01	-6.10*
	Consumption Expenditure	-0.04	0.09	-0.51
	HH Type	0.08	0.07	11.29*
Constant		2.5	0.14	16.82
Log-Likelihood Function = -1,080.82.				
Mean-Square Error = 0.71.				
Himachal Pradesh (N = 1,787)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.35	0.07	4.56*
	Sex of the head	-0.16	0.06	-2.58**
	Age of HH head	-0.02	0.01	-15.21*
	Religion	-0.07	0.02	3.18*
	Social Group	0.03	0.07	4.73*
	HH Size	0.06	0.01	4.76*
Institutional Variable	Distance Primary	0.02	0.05	0.38
	Distance Upper Primary	0.01	0.03	0.53
	Distance Secondary	-0.07	0.02	-2.93*
Economic Variables	Asset (Land)	0.05	0.01	2.71*
	Consumption Expenditure	0.07	0.09	7.54*
	HH Type	-0.05	0.02	-2.14**
Constant		3.35	0.2	16.16
Log-Likelihood Function = -319.15.				
Mean-Square Error = 0.61 (*significant at 1% level; **significant at 5% level).				

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)Table A3 Tobit Analysis (countided)

Jkharkhand (N = 2,465)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.57	0.06	8.33*
	Sex of the head	-0.36	0.07	-4.85*
	Age of HH head	-0.08	0.01	-4.99*
	Religion	0.02	0.01	1.87**
	Social Group	0.04	0.08	5.12*
	HH Size	0.08	0.01	0.74
Institutional Variable	Distance Primary	-0.02	0.03	-0.54
	Distance Upper Primary	-0.06	0.01	-3.77*
	Distance Secondary	0.01	0.01	1.14
Economic Variables	Asset (Land)	0.02	0.01	1.38***
	Consumption Expenditure	0.06	0.01	4.83*
	HH Type	0.05	0.02	2.43**
Constant		0.99	0.16	6.08

Log-Likelihood Function = -1,478.36.
Mean-Square Error = 0.71.

Janmu & Kasmir (N = 1,701)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.27	0.07	3.72*
	Sex of the head	0.54	0.09	0.58
	Age of HH head	-0.01	0.01	-5.59*
	Religion	-0.29	0.04	-6.68*
	Social Group	0.02	0.09	2.43**
	HH Size	-0.05	0.01	-3.50*
Institutional Variable	Distance Primary	-0.11	0.08	-1.35***
	Distance Upper Primary	0.03	0.03	0.88
	Distance Secondary	-0.05	0.02	-2.08**
Economic Variables	Asset (Land)	0.01	0.02	0.05
	Consumption Expenditure	0.01	0.01	12.98*
	HH Type	0.07	0.02	0.28
Constant		2.03	0.23	8.8

Log-Likelihood Function = -669.54.
Mean-Square Error = 0.82 (*significant at 1% level; **significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Karnataka (N = 4,195)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.31	0.05	6.17*
	Sex of the head	-0.19	0.04	-4.45*
	Age of HH head	-0.01	0.01	-12.47*
	Religion	-0.03	0.02	1.26
	Social Group	0.04	0.05	8.85*
	HH Size	-0.03	0.08	-0.03
Institutional Variable	Distance Primary	0.27	0.05	5.30*
	Distance Upper Primary	-0.02	0.03	-0.72
	Distance Secondary	-0.05	0.01	-0.32
Economic Variables	Asset (Land)	0.01	0.08	1.63***
	Consumption Expenditure	0.09	0.06	13.87*
	HH Type	0.14	0.01	7.81*
Constant		1.7	0.12	13.76

Log-Likelihood Function = -1,324.82.
Mean-Square Error = 0.76.

Kerala (N = 2,814)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.15	0.05	2.85*
	Sex of the head	-0.24	0.04	-5.34*
	Age of HH head	-0.01	0.01	-13.47*
	Religion	-0.02	0.02	-1.02
	Social Group	0.04	0.07	6.69*
	HH Size	0.03	0.01	3.53*
Institutional Variable	Distance Primary	-0.04	0.03	-1.31
	Distance Upper Primary	0.03	0.03	1.04
	Distance Secondary	-0.04	0.02	-2.22*
Economic Variables	Asset (Land)	0.07	0.02	3.90*
	Consumption Expenditure	0.05	0.07	6.99
	HH Type	0.11	0.02	0.44
Constant		5.84	0.16	35.59

Log-Likelihood Function = 846.60.
Mean-Square Error = 0.28 (*significant at 1% level; **significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)Table A3 Tobit Analysis (countided)

Mahaarastra (N = 8,054)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.42	0.03	11.97
	Sex of the head	-0.29	0.03	7.75*
	Age of HH head	-0.01	0.08	-20.81*
	Religion	0.03	0.09	0.35
	Social Group	0.03	0.03	9.06*
	HH Size	0.02	0.05	5.06*
IInstitutional Variable	Distance Primary	-0.03	0.03	-0.93
	Distance Upper Primary	-0.02	0.01	-1.55***
	Distance Secondary	-0.04	0.01	-3.90*
Economic Variables	Asset (Land)	0.02	0.05	5.02*
	Consumption Expenditure	0.04	0.01	15.13*
	HH Type	0.04	0.01	3.73*
Constant		2.92	0.08	32.6

Log-Likelihood Function = -1,492.91.
Mean-Square Error = 0.64.

Meghaloya (N = 1,374)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.12	0.08	1.49***
	Sex of the head	-0.21	0.08	-2.66**
	Age of HH head	-0.02	0.02	-8.44*
	Religion	-0.04	0.01	-2.30**
	Social Group	-0.17	0.01	-1.42***
	HH Size	-0.06	0.01	-3.45*
Institutional Variable	Distance Primary	0.07	0.07	0.98
	Distance Upper Primary	0.04	0.02	-1.66***
	Distance Secondary	0.01	0.04	2.31**
Economic Variables	Asset (Land)	0.02	0.02	1.44***
	Consumption Expenditure	0.05	0.01	4.01*
	HH Type	-0.02	0.02	-0.87
Constant		5.41	0.22	23.93

Log-Likelihood Function = -800.86.
Mean-Square Error = 0.17 (*significant at 1% level; **significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Mejoram (N = 1,276)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.11	0.06	1.68***
	Sex of the head	0.13	0.08	1.67***
	Age of HH head	-0.09	0.01	-5.28*
	Religion	-0.53	0.04	-11.49*
	Social Group	-0.14	0.04	-3.29*
	HH Size	-0.03	0.01	-3.24*
Institutional Variable	Distance Primary	0.03	0.25	0.12
	Distance Upper Primary	-0.42	0.06	-6.36*
	Distance Secondary	0.06	0.08	0.8
Economic Variables	Asset (Land)	0.03	0.09	0.34
	Consumption Expenditure	0.03	0.01	2.98*
	HH Type	-0.02	0.03	-0.76
Constant		13.64	0.43	31.58
Log-Likelihood Function = 896.63.				
Mean-Square Error = 0.12.				
Madhya Pradesh (N = 5,518)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.45	0.03	11.52*
	Sex of the head	-0.17	0.05	-3.19*
	Age of HH head	-0.01	0.01	-17.54*
	Religion	0.03	0.02	1.33
	Social Group	0.08	0.05	15.56*
	HH Size	0.04	0.07	6.89*
Institutional Variable	Distance Primary	0.05	0.09	0.59
	Distance Upper Primary	0.03	0.04	0.73
	Distance Secondary	0.07	0.08	0.85
Economic Variables	Asset (Land)	0.04	0.07	5.72*
	Consumption Expenditure	0.07	0.07	9.66*
	HH Type	0.09	0.01	5.92*
Constant		1.25	0.09	13.03
Log-Likelihood Function = -2,290.82.				
Mean-Square Error = 0.86 (*significant at 1% level; **significant at 5% level).				

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)Table A3 Tobit Analysis (countided)

Monipur (N = 2,214)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.23	0.05	4.64
	Sex of the head	-0.28	0.05	-4.85*
	Age of HH head	-0.02	0.01	-16.92*
	Religion	-0.01	0.01	-1.2
	Social Group	-0.08	0.09	-0.88
	HH Size	-0.02	0.01	-1.68
Institutional Variable	Distance Primary	0.05	0.03	1.8
	Distance Upper Primary	0.02	0.03	0.88
	Distance Secondary	0.02	0.09	2.67**
Economic Variables	Asset (Land)	-0.05	0.01	-0.29
	Consumption Expenditure	0.01	0.01	7.10*
	HH Type	-0.08	0.02	-3.32*
Constant		4.01	0.16	24.16

Log-Likelihood Function = -1,976.26.
Mean-Square Error = 0.29.

0rissa (N = 4,141)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.31	0.04	6.33*
	Sex of the head	0.04	0.01	3.05*
	Age of HH head	0.02	0.01	2.49*
	Religion	-0.03	0.04	-0.78
	Social Group	0.02	0.05	5.06*
	HH Size	-0.01	0.08	-1.44
Institutional Variable	Distance Primary	0.05	0.03	1.43
	Distance Upper Primary	-0.17	0.01	-9.33*
	Distance Secondary	-0.09	0.04	-1.84**
Economic Variables	Asset (Land)	-0.04	0.01	-0.41
	Consumption Expenditure	0.06	0.01	6.05*
	HH Type	0.05	0.01	3.01*
Constant		1.21	0.11	10.35

Log-Likelihood Function = -2,036.1.
Mean-Square Error = 0.10 (*significant at 1% level; **significant at 5% level).

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Nagaland (N = 1,404)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.46	0.07	5.89*
	Sex of the head	0.24	0.12	1.94**
	Age of HH head	-0.44	0.02	-17.64*
	Religion	-0.06	0.08	-0.07
	Social Group	-0.1	0.03	-3.05*
	HH Size	-0.03	0.02	-1.39
Institutional Variable	Distance Primary	0.02	0.03	1.07
	Distance Upper Primary	-0.09	0.03	-2.60*
	Distance Secondary	-0.01	0.01	-0.77
Economic Variables	Asset (Land)	0.07	0.01	4.26*
	Consumption Expenditure	0.04	0.01	3.72*
	HH Type	-0.14	0.02	-5.08*
Constant		5.64	0.36	15.35
Log-Likelihood Function = -757.63.				
Mean-Square Error = 0.15.				
Punjab (N = 1,279)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.65	0.23	2.83*
	Sex of the head	-0.02	0.02	-1.24
	Age of HH head	0.05	0.09	5.64*
	Religion	0.01	0.01	0.89
	Social Group	-0.12	0.09	-1.37
	HH Size	0.38	0.22	-1.72**
Institutional Variable	Distance Primary	-0.01	0.03	-0.39
	Distance Upper Primary	0.04	0.09	4.84*
	Distance Secondary	0.05	0.03	1.58***
Economic Variables	Asset (Land)	0.01	0.05	0.26
	Consumption Expenditure	0.01	0.01	0.8
	HH Type	0.58	0.09	-1.72**
Constant		1.12	0.2	5.61
Log-Likelihood Function = -373.93.				
Mean-Square Error = 0.74 (*significant at 1% level; **significant at 5% level).				

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)Table A3 Tobit Analysis (countided)

Rajasthan (N = 4,408)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.31	0.04	6.63*
	Sex of the head	-0.31	0.05	-5.75*
	Age of HH head	-0.01	0.01	-15.38*
	Religion	-0.09	0.02	-3.70*
	Social Group	0.08	0.05	13.53
	HH Size	0.03	0.07	4.18
Institutional Variable	Distance Primary	-0.03	0.04	-0.8
	Distance Upper Primary	-0.07	0.02	-3.33*
	Distance Secondary	-0.08	0.01	-6.87*
Economic Variables	Asset (Land)	0.01	0.07	0.15
	Consumption Expenditure	0.01	0.08	14.85*
	HH Type	0.02	0.01	1.33
Constant		1.88	0.12	15.27
Log-Likelihood Function = -1,873.92.				
Mean-Square Error = 0.80.				
Tamil Nadu (N = 5,672)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.21	0.04	5.25*
	Sex of the head	-0.29	0.03	-7.69*
	Age of HH head	-0.02	0.01	-24.06*
	Religion	0.11	0.02	4.27*
	Social Group	0.08	0.09	8.60*
	HH Size	0.08	0.09	8.73*
Institutional Variable	Distance Primary	0.08	0.04	2.16*
	Distance Upper Primary	-0.05	0.01	-2.98*
	Distance Secondary	-0.45	0.01	-3.48*
Economic Variables	Asset (Land)	0.03	0.01	3.79*
	Consumption Expenditure	0.07	0.06	11.53*
	HH Type	0.05	0.01	3.21*
Constant		2.99	0.11	25.52
Log-Likelihood Function = -1,204.00.				
Mean-Square Error = 0.66 (*significant at 1% level; **significant at 5% level).				

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)

Tripura (N = 2,279)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.61	0.41	0.14
	Sex of the head	0.05	0.02	2.28*
	Age of HH head	0.02	0.01	1.85**
	Religion	-0.05	0.02	-1.99**
	Social Group	0.04	0.06	0.73
	HH Size	0.48	0.41	1.17
Institutional Variable	Distance Primary	0.01	0.07	2.07**
	Distance Upper Primary	0.04	0.02	1.42***
	Distance Secondary	0.01	0.01	1.43***
Economic Variables	Asset (Land)	-0.46	0.01	-0.02
	Consumption Expenditure	0.01	0.01	1.55*
	HH Type	-0.01	0.02	-0.53
Constant		1.68	0.13	12.22
Log-Likelihood Function = -664.45.				
Mean-Square Error = 0.79.				
Uttaranchal (N = 1,309)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.47	0.08	5.73*
	Sex of the head	-0.24	0.07	-3.16*
	Age of HH head	-0.02	0.02	-9.66*
	Religion	-0.16	0.04	-3.42*
	Social Group	0.76	0.09	8.12*
	HH Size	0.04	0.01	0.32
Institutional Variable	Distance Primary	0.03	0.01	2.27*
	Distance Upper Primary	0.08	0.02	2.99*
	Distance Secondary	0.01	0.06	1.62**
Economic Variables	Asset (Land)	0.04	0.02	1.86**
	Consumption Expenditure	0.01	0.01	7.30*
	HH Type	-0.01	0.03	-0.4
Constant		2.07	0.21	9.85
Log-Likelihood Function = -405.02.				
Mean-Square Error = 0.74 (*significant at 1% level; **significant at 5% level).				

Table A3 Summary of Tobit Analysis Dependent Variable: Proportion of Family Literacy (countided)Table A3 Tobit Analysis (countided)

Uttar Pradesh (N = 10,078)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.42	0.03	14.02*
	Sex of the head	-0.04	0.03	-1.34
	Age of HH head	-0.01	0.007	-17.69*
	Religion	-0.34	0.02	-14.88*
	Social Group	0.08	0.04	20.33*
	HH Size	0.05	0.004	11.29*
Institutional Variable	Distance Primary	0.01	0.07	6.97*
	Distance Upper Primary	-0.05	0.01	-4.65*
	Distance Secondary	0.09	0.02	0.39
Economic Variables	Asset (Land)	0.04	0.07	6.97
	Consumption Expenditure	0.09	0.05	17.23*
	HH Type	0.05	0.01	4.70*
Constant		1.056	0.077	13.68

Log-Likelihood Function = -4,804.20.
Mean-Square Error = 0.09.

West Bengal(N = 7,018)				
Variables		Coefficients	SE	T ratio
Social Variables	Sector	0.58	0.03	16.55*
	Sex of the head	-0.3	0.03	-7.78*
	Age of HH head	-0.02	0.09	-2.56*
	Religion	-0.09	0.01	-5.89*
	Social Group	0.01	0.03	2.88*
	HH Size	0.03	0.06	5.77*
Institutional Variable	Distance Primary	-0.12	0.03	-3.22*
	Distance Upper Primary	-0.05	0.01	-4.75*
	Distance Secondary	0.03	0.04	10.63*
Economic Variables	Asset (Land)	-0.04	0.09	-4.84*
	Consumption Expenditure	0.04	0.04	10.63*
	HH Type	-0.01	0.01	-0.89
Constant		2.08	0.09	22.54

Log-Likelihood Function = -2,591.57.
Mean-Square Error = 0.87-0.89(*significant at 1% level; **significant at 5% level).

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   Gregory claims:
   Coefficient alpha is an index of the internal consistency of the items, that is, their tendency to correlate with one another. Insofar as a test or scale with high internal consistency will also tend to show stability of scores in a test-retest approach, coefficient alpha is therefore a useful estimate of reliability. (Manning & Munro, 2006, p. 25)
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   Articles in press
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Bryne, J. (Ed.). (2012). *The occupy handbook*. New York: Back Bay Books.

Chapter in a Book

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