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The place of meta-strategies in developing collaborative  
agendas for research in education: Personal reflections of  
cross-national experiences.

Sim Wong Kooi,  
Universiti Brunei Darussalam

### Introduction

This paper is an extension and an expansion of my earlier presentation on Lessons learned, unlearned and relearned in developing collaborative agendas for research in education. It is an extension in the sense that it goes beyond the strategies embodied in what I have termed as the six pairs of Cs to deal with what I regard as meta-strategies. At the same time, since the meta-strategies are closely related to the six pairs of Cs, further elaboration of the anecdotal accounts of my personal experiences in three countries, together with additional examples of cross-national research, would constitute an expansion of my earlier paper.

What then are the "meta-strategies" and how are they related to the six pairs of Cs? A meta-strategy is itself a strategy, but one that provides an integrative framework for other strategies. The three meta-strategies that I have found to be particularly useful in developing collaborative agendas for research in education are the "systemic," "synergistic" and "symbiotic" meta-strategies.

The Systemic meta-strategy may be defined as the Strategy of viewing the entire system, as well as its sub-systems and supra-systems, in terms of structural, functional and interactive relationships and relevant inputs, throughputs and outputs. I often use a bird analogy to characterise a meta-strategy. In the case of the systemic meta-strategy, it is analogous to Having a bird's eyeview, as well as a worm's eye view. It involves a panoramic or comprehensive view of the the whole situation, while at the same time recognising the importance of contextual differences. It also emphasises the need for coherence in viewing various inter-relationships as well as continuity in taking cognisance of the time perspective. Hence, the Systemic meta-strategy is closely related to the two pairs of Cs, namely Comprehensiveness & Context and Coherence & Continuity.

The Synergistic meta-strategy is defined as the Strategy of generating wider-ranging, value-added outcomes through proactive planning and the

innovative integration of otherwise disparate actions. Again, using a bird analogy, this is like Killing two or more birds with one stone, and retrieving the stone for further re-use. Innovative or creative thinking is required in order that the outcomes produce greater mileage and are regarded as more desirable or competitive in comparison with available alternatives. Special attention would also need to be paid to ensure that various efforts or initiatives complement rather than duplicate each other and that, as far as possible, they are conserved rather than dissipated in needless conflicts of opinion. The Synergistic meta-strategy is therefore closely related to the two pairs of Cs, namely Creativity & Competitiveness and Complementarity & Conservation.

Finally, I have defined the Symbiotic meta-strategy as the Strategy of

seeking collaborative involvement, and possible networking, of relevant stakeholders for mutual benefit. Using a bird analogy once again, this situation is similar to that of Getting birds of the same feather, as well as birds of different feathers to flock together. In dealing with people, or the featherless birds, the need to avoid communication breakdown is crucial, especially in view of the diversity of backgrounds and perspectives, which need to be carefully co-ordinated. When the team members or partners are more collegial, rather than hostile, and more caring, rather than indifferent, a collaborative project is more likely to succeed. Hence, the Symbiotic meta-strategy viewed as being closely related also to two pairs of Cs, namely Communication & Co-ordination and Collegiality & Care.

Systemic meta-strategy:

Comprehensiveness & Context, Coherence & Continuity.

Senge (1992) refers to "systems thinking" as "the fifth discipline," which he regards as "the cornerstone of the learning organisation." As far back as 1972, when three of my colleagues and I from the University of Malaya were involved as consultants to RECSAM in teaching various courses on curriculum development and curriculum evaluation in primary science and mathematics, we decided to mobilise the participants from SEAMEO countries towards developing and trialling various curriculum modules in their respective countries. The collaborative project, which lasted some eight years, was called SEASAME, or South-East Asia Science And Mathematics Experiment. A conceptual framework was developed which re-oriented the teaching of common topics based on systems thinking (Sim, 1973). For example, instead of the usual treatment of the topic "seed dispersal," in which students would be shown examples of the different ways that seeds disperse, they would initially compare the growth of two lots of seedlings, one close together and another further apart, in order to arrive at the reason why seeds need to disperse before examining the different modes of seed dispersal. Similarly, for the topic "beauty in balance," which deals with the concept of symmetry, instead of the usual approach of defining

symmetry followed by some geometrical examples, the students explore different objects and shapes and discover not only the properties but also the beautiful patterns of bilateral symmetry. SEASAME itself was illustrative of the comprehensive use of systems thinking in orchestrating the development of different curriculum materials by different participants in different courses in different years and evaluated in different countries using different evaluation instruments.

Needless to say, there were substantial differences between the countries not only in the relative effectiveness of the modules but also in the relative relevance of the systemic approach to curriculum development, especially during the first few years when Cambodia, Laos and Vietnam were members of SEAMEO. (Sim et al., 1973). However, feedback from past participants were most encouraging, especially in their perception of the importance of the systemic perspective in curriculum improvement in their respective countries. (Sim, 1976).

When I was with the University of Malaya, attempts to establish an Educational Research and Resource Unit (ERRU) failed or fizzled out, mainly because, apart from associates in the collaborative projects that I was personally involved with, most of my colleagues preferred to conduct research on an individual basis as this was perceived to produce quicker and more controllable results than working as a team. Moreover, there was lack of a comprehensive framework for supporting collaborative measures.

During the eighties in Singapore, the Institute of Education was able to adopt a multi-pronged approach to setting up a research agenda (Sim & Ho,

1990), which included the following:-

1. Provision of suitable facilities and resources, including the solicitation of external funds, to support relevant research.
2. Formal recognition of research as a crucial criterion for staff recruitment, promotion and development, including inviting overseas scholars to conduct research-oriented workshops for staff and encouraging in-house staff interaction seminars.
3. Incorporation of research or investigatory work into the major pre-service and in-service programmes, including revamping the Master of Education programme to incorporate proper coursework and supervised research.
4. Sensitisation of all educational personnel to the possible use and/or conduct of research, including the regular publication of the Singapore Journal of Education, Teaching and Learning and REACT and the occasional publication of Research Papers.
5. Formation of an Educational Research Association (ERA), which is

deliberately school-focussed, including having the bulk of its membership coming from schools.

6. Establishment of an Educational Research Unit (ERU) , which was responsible for co-ordinating and promoting research, including the so-called Research in Teacher Education (or RiTE) studies, was given a boost with a major conference on Research and Teacher Education in 1983.

In Brunei Darussalam, many members of staff at the Sultan Hassanah Bolkuah Institute of Education (SHBIE) have yet to be convinced of the advantages of developing a collaborative agenda for research in education. While many local staff are still undertaking postgraduate studies overseas, many contract staff, as pointed out in my earlier presentation, tend to prefer a shorter time frame for research which often replicates what they have conducted elsewhere. Nevertheless, the process of thinking through what should constitute and what could support a collaborative agenda for research in education has already begun, and over thirty projects are either at the planning stage or have recently taken off.

In learning from the experiences in Malaysia and Singapore, the process of systemic thinking in terms of the total long-term scenario rather than wishful thinking that, merely by establishing a research unit and encouraging research, staff would be inclined to develop and contribute towards a collaborative research agenda, is being applied to Brunei Darussalam, except that the components would take longer to unfold. As indicated earlier, we envisage five major initiatives. So far, only the Collaborative Agenda for Research in Education (CARE 2) has effectively taken off. The Centre for Applied Research in Education (CARE 1) would hopefully be in operation early next year, while some preliminary discussions on the Criteria for Applied Research in Education (CARE 3) have begun. The setting up of a tripartite Committee for Applied Research in Education (CARE 4) and a Confederation of Associations for Research in Education (CARE 5) will probably take place much later.

That a collaborative agenda did not emerge from the various collaborative projects in Malaysia during the sixties and seventies is probably due to the lack of a coherent framework, to which the separate projects could relate. During the eighties in Singapore, such a framework was developed for organising the various Research in Teacher Education studies as shown in Fig. 1 below.

Fig. 1. Conceptual framework for Research in Teacher Education Studies

A similar approach has been adopted in Brunei Darussalam recently. Based on perceived pressing problems in education by representatives from SHBIE, the Ministry and some schools, the framework shown in Fig. 2 was developed. In

the meantime,

Fig. 2. Conceptual framework for Collaborative Agenda for Research in Education

some initiatives are being considered to develop some "meta-research" projects aimed at "Enhancing Research and Planning" (ERP) One such project, which is about to commence, involves "Establishing Information Networking for Enhancing Research and Planning in Education." Some of the activities envisaged for this project include the following:

1. Development of intranet web pages for sharing information regarding the CARE projects, as well as other educational research projects, including special school projects.
2. Development of school-based information systems to complement the centralised management information system that the Ministry of Education is in the process of establishing.
3. Periodic review or synthesis of the state-of-the-art or the state-of-the-practice regarding each of the four major areas in the collaborative agenda, namely Motivation to Learn, Motivation to Teach, Developing Language Proficiency and Developing Professional Competence.
4. Sharing of alternative and innovative research methodologies through seminars/workshops or electronic exchanges among research partners from the university, the Ministry and the schools.
5. Testing the usefulness of data bases through their application in specific case studies, such as in monitoring school effectiveness or school improvement.

As suggested by Senge (1992), systems thinking, and hence systemic meta-strategy as well, involves the "art of seeing the forest and the trees."

Synergistic meta-strategy:

Creativity & Competiveness, Complementarity & Conservation.

Recently, Gruner (1995) pointed out that the so-called "conflict" between professional research and teaching is needless since the two fields of endeavour should complement each other. While it has often been shown that "research can enliven and update a professor's teaching, little attention has been directed to the converse, the possibility that a professor's teaching can definitely enhance his/her research and consequent publication output." He then provided examples of how the latter could be achieved. Although his paper was entitled "The teaching/research symbiosis," it is perhaps more appropriate to refer to it as "The teaching/research synergy," since we are referring to two processes, rather than persons, that are synergised to produce outputs that are greater than what each process would produce independently.

I have often tried to encourage the use of such a strategy in research. In the early 1970s a number of my colleagues and I found it most beneficial to weave research into our teaching and other responsibilities. For example, Lau (1972) investigated the usefulness of augmenting lecture presentation

with structural support. Among other things he found that a mixture of schematic and thematic structural support was most effective; but, if only one type of structural support was to be employed, the schematic structural support was most useful at the beginning as an overview of the main components of the lecture, while the thematic structural support was most useful at the end as a synopsis of the main points of the lecture. In assisting teachers from the Sekolah Sri Petaling, an associated school of the Faculty of Education, to improve the teaching of science and mathematics, Khoo (1972) found some useful relationships between cognitive development and the learning of these subjects, which, in the current zeitgeist, would have been termed as the constructivist approach to the learning of science and mathematics. In the late 1960s, we were exploring microteaching as an important form of teaching practice. In order to justify the various ways in which microteaching could be used to advantage, we began a series of studies on microteaching. For example, Sim et al. (1972) studied the effects of incorporating microteaching into macroteaching, which referred to the school-based teaching practice. While having microteaching was found to be more beneficial than none at all, it was more effective to schedule microteaching before macroteaching than the other way round.

It is always a challenge to develop research projects using synergistic meta-strategies. In the first place, one needs to be creative in developing rapprochement between apparently disparate or dissociated aspects - such as research and teaching, research and teacher professional development, or microteaching and macroteaching. Educational researchers often polarise themselves and engage in counter-productive acrimonious debates over which school of thought is the correct one. One seemingly endless issue concerns the prevalence of so-called paradigm - or should we say, pendulum - shifts in recent years from the scientific paradigm to the humanistic paradigm. Keeves (1988) has characterised the two types of paradigms as follows:

"The scientific paradigm has been built on the approaches employed in the natural sciences and has emphasised the use of empirical, quantifiable observations in order to provide causal explanations of educational phenomena."

"Within (the humanistic) paradigm, there is an emphasis on holistic and qualitative informaton, and the purposes of research are to provide understanding and an interpretive account of educational phenomena."

In my experience, both paradigms are useful and complementary and the challenge is to embody both eclectically within the same research. A team which comprises members from both persuasions should be greatly enriched, provided they do not engage in the futile, or puerile, attempt to disparage each other. Perhaps there should be concerted attempts to demonstrate the synergistic effect of a pluralistic perspective or the epistemological unity of educational research, such as the work of Walker and Evers (1988). According to them, "Emphasis on both unity and diversity within the field of inquiry into educational problems ... meets the urgent need for reconciling the conflicts that currently exist in the field and the development of a more

Table 1. Criteria for Applied Research in Education

CRITERIA	CASE STUDIES
Relevance:	Illustrating:
Meaningfulness	Technicality e.g. Use of item response theory in pupil profiling (FARE #1)
Utility	Triviality e.g. Non-intuitive factors associated with quality of education (FARE #2)
Reality:	
Parsimony	Complexity e.g. Factors associated with bilingual code-switching: A pilot study (FARE #3)
Clarity	Ambiguity e.g. Teacher burnout: An occupational hazard (FARE #4)
Timeliness	Untimeliness e.g. Prediction of long term success in teaching: Phase One results (FARE #5)
Sensitivity	Insensitivity e.g. Motivation: The context effect (FARE #6)
Rigour:	
Generalisability	Non-generalisability e.g. Added problems from student with ADD problems (FARE #7)
Cost-effectiveness	Inefficiency e.g. Use of expert systems technology in teaching basic maths (FARE #8)

coherent approach to research."

Unlike the situation in business and industry where outcomes and products are more tangible and measurable, the criteria for success in an educational endeavour is less apparent. While the former strive towards attaining a competitive edge in terms of increased productivity, differences of opinion regarding criteria for success in educational research render quality control and competitiveness somewhat tenuous. One approach is to develop a set of criteria for applied research in education, against which research projects may be assessed. However, this is by no means an easy task. For example, one of the three missions of the Universiti Brunei Darussalam's strategic plans is research ("It aims to promote and undertake research in areas where it has a comparative advantage and in accordance with national needs") and it was explicitly stated in one of the objectives that "UBD will, during the planning period, give emphasis to applied research." A UBD Research Committee, chaired by me, was accordingly formed to address the issues and make recommendations. One major issue was our interpretation of "applied research," and the Committee had to accept multiple conceptions, which range from "research which would enhance teaching" to "research which is directly applicable to the needs of Brunei Darussalam." The former conception would virtually mean that research on topics which have no relevance to Brunei Darussalam but are nevertheless taught could be considered as "applied research."

During the workshop which was convened to develop the Collaborative Agenda for Research in Education (CARE 2), it was decided to involve the participants in developing suitable Criteria for Applied Research in Education (CARE 3). For this purpose, eight case studies or Fictitious Applied Research Exemplars (FAREs) were developed, each of which portrayed some undesirable characteristic of a research report that would suggest a desirable criterion for applied research in education. While most participants were spot on in identifying the undesirable characteristic for some of the FAREs, such as "technicality" or "over-technicality" for FARE #1 (See ANNEX 1), they arrived at different criteria from what were intended for some other FAREs, such as "non-user friendly" or "poor

selection of variables" for FARE #2 (See ANNEX 2).

Table 1 lists the undesirable characteristics that were intended for the eight case studies as well as the corresponding desirable characteristics, which constitute the set of criteria for applied research in education that were envisaged. The eight criteria are also classified under the three broad criteria of relevance, reality and rigour. Thus, in order that a research report would be regarded as relevant, it ought to be meaningful and not include too many technical terms and it ought not to include variables that are trivial in the sense that they present a naive picture of the true situation, where utility is important. For example, "class size" is not a suitable variable to use because it is confounded by the

fact that good schools are generally more popular and often forced to increase their class size, thereby producing the artificial effect of being directly related to the quality of schools, resulting in the naive decision to increase class size.

It is therefore envisaged that the challenge of refining and internalising the criteria for applied research in education and applying them to improve our collaborative agenda for research in education is a major and continuing one. Hopefully, the synergistic meta-strategy would assist us to meet the challenge.

Symbiotic Meta-strategy:

Communication & Co-ordination, Collegiality & Care

One basic weakness of researchers, including myself, is our lack of ability to communicate effectively with major stakeholders, namely practitioners and policy-makers. I called this the lack of "research wisdom." (Sim, 1985) In her presidential address to the British Educational Research Association, Brown (1991) raised two points concerning the importance of "practical wisdom", namely:

"1. The first is that the nature of research is such that inevitably its impact will be delayed because it is dependent on the growth of practical wisdom, not just among researchers but also policy-makers and practitioners. Fundamental learning of that kind takes time. Unfortunately, decisions are often made much more quickly and may seem incomprehensible in researchers' eyes.

2. The second point is that a major and continuing priority for researchers must be to educate others to have realistic expectations of research and to take full advantage of what it has to offer."

I have resorted to various forms of communication, especially when dealing with findings that were regarded as sensitive. However, on reflection, we might have been somewhat over-cautious. Perhaps a different approach could have been adopted in which relevant stakeholders are members of the research team right from the start. At the same time, it is important not to abandon the exploration of alternative ways of communication.

For instance, I led a team to evaluate science and mathematics education in relation to the mid-term review of the Second Malaysia Plan. (Sim et al., 1973). We were "bothered by the probability, which appears to be reasonably high in our estimation, that beneath the ice-berg of quite a few additional comments by principals, teachers and, in some cases, state science supervisors or organisers, who generally preface them with remarks such as: 'Please don't quote me ...,' 'These are my personal (and not official) views ...,' or 'I'd like to say what I really think but I hope you will not include my remarks in your report ...,' lie the recalcitrant clues to the persistent problems confronting Science and Mathematics Education in this

country."

Lest our detailed findings escape important stakeholders who might be able to flip through the report, we tried to encapsulate the main findings and recommendations in two words, "paternalism" and "Janus-face," which were defined and illustrated by means of two drawings as the frontispiece of the report. Thus, apart from the drawings, we hoped that the following statement would characterise the essence of our report:

"Our overall finding is that the major problem confronting the Science and Mathematics curriculum reform lies in a kind of paternalism which comprises 'a complacent, over-protective attitude that has a tendency to stifle initiative and reinforce over-dependence.' Our overall commendation might similarly be characterised by Janus-face, which we have interpreted as the 'maintenance of an orchestrated perspective, involving having to look in at least two directions simultaneously.' "

Understandably, when researchers fail to recognise that when they overly or unduly criticise an educational system, they only have themselves to blame when approval for them to conduct research, or to disseminate research findings, is turned down. Ethnic differences have always been regarded as highly sensitive or even taboo for researchers. In this regard, it is indeed heartening that in 1991, the then Minister for Education, made public some crucial data showing the relative examination performances by race. He was also able to announce that, encouraged by the Ministry of Education, various initiatives by ethnic community groups were beginning to bear fruit.

Table 2. Top 10 Ranks for Main Pressing Problems

PRESSING PROBLEMS Top 10 Ranks

RR SR R1 R2\*

1. Poor attitude towards work. [3] 1 1 1 1
2. Low achievement motivation. [5] 2 2 2 2
3. Low science and maths performance. [2]
4. Highly exam-oriented education system. [4] 9 7 9 8
5. Poor time, materials & human resource management. [7] 3 8 8 6
6. Failure to attract the best students in teacher education. [4] 5 4 5 4
7. Low parental interest and involvement. [2]
8. Undesirable peer pressure and influence. [1]
9. Inappropriate and/or ineffective teaching. [4] 6 5 10 7
10. Inadequate attention to crucial skills/methodologies. [4] 10 9 6 9
11. Poor organisation vis-a-vis UBD-school linkages. [2]
12. Poor organisation vis-a-vis time for research

- by Faculty of Education staff. [1]
13. Debilitating lack of language proficiency, 4 3 3 3 especially in English because of the abrupt transition after primary 3. [6]
14. Poor language proficiency due to poor 8 6 7 5 language models of many teachers and inappropriate English language examinations. [4]
15. Poor or conflicting, professional attitudes and 10 skills among teachers. [6]
16. Narrow academic curriculum which neglects the well-rounded education for all and the special needs of the minority. [5]
17. Inadequate provision of specific curriculum materials and facilities. [2]
18. Inadequate provision of in-service education for the continuing professional development of teachers. [4]
19. Lack of relevant data and criteria for educational planning and policy making. [2]
20. Learning problems & learning improvement in schools. [3]
21. Poor organisational efficiency & effectiveness. [1] 7 4 10

\*RR = Real Role; SR = Simulated Role; R1 = Round 1 Role; R2 = Round 2 Role.

There is one instance of self-censorship which, on reflection, is most regrettable. In 1974, I led a team to conduct a study on Value orientations of farmers towards change in Peninsular Malaysia. Although the "massive study" was acknowledged by the Permanent Secretary and Director-General of the Socio-economic Research and General Planning Unit of the Prime Minister's Department as "a significant contribution to the yet meagre literature on development in Malaysia," (Sim & Yeoh, 1976), it was a pity that we avoided ethnic differences which were abundantly clear, even though our research design had not included these variables. Thinking back, it would probably not have been harmful for the officers who were involved in implementing development projects to be apprised of these differences, so that they would be more enlightened in offering specific assistance. Instead the study concentrated on comparing rubber and rice farmers as well as between so-called success groups according to criteria of productivity and participation. With regard to the latter, the comparisons between the more successful individuals in less successful (or depressed) areas (MILA) with less successful individuals in more successful areas (LIMA) were found to be especially interesting and useful. (Sim, 1977)

A symbiotic meta-strategy would therefore be to include some of the government officers and even a few representatives of farmers in the formulation, conduct as well as the interpretation of the study. With attention to Communication & Co-ordination and Collegiality & Care, the

ethnic differences might not have been so sensitive after all.

In formulating the collaborative agenda for research in education (CARE 2) in Brunei Darussalam, we decided to involve representatives from the Ministry

of Education and schools right from the start. For the first workshop involving 45 people from the Ministry, the schools and the university, the participants were initially asked to think of three pressing problems as well as a promising practice. The following definitions were provided:

A Pressing Problem is a persistent or debilitating problem that has apparently been detrimental to the quality of education and should therefore be resolved or removed as soon as possible.

A Promising Practice is a practice that has been successful in solving some pressing problem(s) and which is most likely to be applicable to other situations faced with similar problems.

While not many submitted promising practices, which, in any case, did not seem to be too promising, 129 pressing problems were submitted and these were collapsed into 21 categories, as shown in Table 2. During the workshop, the the participants were initially asked to rate these pressing problems from the perspective of their actual or real roles, namely as Ministry officer, school personnel or teacher educator. Their responses were quickly keyed into a computer and the results were used for discussion by four heterogeneous groups. In a second round of rating the pressing problems, they were assigned a different role and asked to try and imagine how the person in the changed or simulated role was likely to rate the 21 categories.

The responses were then ranked and the top ten ranks for the different roles and different rounds are shown in Table 2. After considerable discussion of the top ten ranks, which appear to be quite similar for the different roles and different ranks, the relevant categories were further collapsed into four major areas, which constituted our collaborative agenda, as shown earlier in Fig. 2. Arising from extensive discussion of possible projects, a fifth "meta-research" area, which involves research and evaluation for "Enhancing Research and Planning" was included. As mentioned earlier, the project, "Establishing Information Networking for Enhancing Research and Planning in Education" is about to begin.

#### Possible Directions

The foregoing "cook's tour" of a few of my experiences in collaborative research was not meant to be exhaustive nor exhausting but merely to highlight the importance of the three meta-strategies. While I firmly believe that a collaborative agenda is preferable to individual or no agenda, I am well aware of the dangers of pressing for collaborative

research when the potential partners do not have the right mindset for collaboration. I could, if time permitted, cite many examples of projects which have been less than successful or which could have been more successful if they were not pursued on a collaborative mode. However, it should suffice for me to quote a number of "dangers" that could be associated with collaboration, as pointed out by Hargreaves (1994). According to him, collaboration can sometimes be very dangerous, in the sense that it can be:

1. Comfortable and complacent

"Collaboration can be confined to safer, less controversial areas of teachers' work ... which can consolidate rather than change existing practice.

2. Conformist

"Collaboration ... can lead to groupthink, suppressing individuality and solitude and the creativity of thought which springs from them."

3. Contrived

"Collaboration can be administratively captured, contrive and controlled in ways that make it stilted, unproductive and wasteful of teachers' energies and efforts."

4. Co-optative

"Collaboration is sometimes used as an administrative and political ruse to secure teachers' compliance with and commitment to educational reforms decided by others."

Nevertheless, should we embark on a collaborative agenda for research in education, it is advisable to think of the three meta-strategies. The Systemic meta-strategy (Sys) provides the helicopter view, while taking cognisance of contextual differences. The Synergistic meta-strategy (Syn) challenges us to be creative and to develop ways of conserving resources through complementary and even competitive activities. The Symbiotic meta-strategy (Sym) encourages the main stakeholders to communicate and co-ordinate their efforts better, perhaps through being more collegial and caring.

If we take the three major partners in the collaborative agenda for research in education to be the School, the (Teacher Education) Institute

and the Ministry (of Education), then one way of conceptualising the place of these meta-strategies is that shown in Fig. 3. It is, for example, possible to delineate a number of dimensions where the three main partners tend to differ in terms of their relative emphases. The Synergistic meta-

strategy may be applied to suggest that greater mileage may be obtained if they should broaden their scope and be concerned also with other aspects beyond their immediate purview. For example, the School should not confine its attention to short-term, practice-based micro research, while the Ministry should not restrict itself to long-term, policy-based macro research. The Symbiotic meta-strategy may be applied when the three predominant partners collaborate and share their experiences and insights from their relative positions of strength. Finally, the Systemic meta-strategy may be applied by maintaining a comprehensive view of inter-relationships, bearing in mind that they differ in a variety of ways in space and time.

Perhaps a research study on the intentional and unintentional use of these meta-strategies - or meta-research on meta-strategies - could be pursued in the future.

Fig. 3. Conceptual framework for considering possible directions of the Collaborative Agenda for Research in Education

## References

Brown, S. (1991). Effective contributions from research to educational conversations: Style and strategy, *British Educational Research Journal*, 17(1), 5-18.

Gruner, C.R. (1995). The teaching/research symbiosis: A two-way street. Paper presented at the Annual Meeting of the Southern States Communication Association, New Orleans, 5-8 April. [ERIC document, ED384086].

Keeves, J.P. (1988). Preface. In J.P. Keeves (Ed.) *Educational Research, Methodology and Measurement: An International Handbook*. Oxford: Pergamon Press. Pp. XV - XXI.

Khoo, P.S. (1972) Relationships between Cognitive Development and the Learning of Science and Mathematics. Unpublished doctoral dissertation, University of Malaya.

Hargreaves, A. (1994). *Changing Teachers, Changing Times*. London: Cassell.

Lau, K C. (1972) Augmenting Lecture Presentation with Structural Support. Unpublished doctoral dissertation, University of Malaya.

Senge, P.M. (1992). *The Fifth Discipline: The Art & Practice of the Learning Organisation*. Sydney: Random House Australia.

Sim, W.K. (1973). *Towards a systems-oriented science for a science-oriented*

society, *Masaalah Pendidikan [Problems in Education]*, 4, 45-58.

Sim, W.K et al. (1974). *Evaluation of SEASAME '74: A Cross National Report*. Malaysia: SEAMEO-RECSAM. 47pp.

Sim, W.K. (1976). *Past participants' perceptions of SEASAME*. RECSAM Seminar on Review of SEASAME, Penang, Malaysia, 18-103.

Sim, W.K. (1977). *MIMA, MILA, LIMA and LILA: A study of rural poverty and value orientation*. In Mokhzani, A.R. & Khoo, S.M. (Eds), *Poverty in Malaysia*. Kuala Lumpur: University of Malaya Press. Pp. 158-212.

Sim, W.K. (1985). *Pipers and tunes: Research, policy and practice*. In John Nisbet & Stanley Nisbet (Eds). *Research, Policy and Practice*. World Yearbook of Education, 1985. London: Kogan Page, 177-186.

Sim, W.K. & Ho, W.K. (1990). *25 years of teacher education*. In J.S.K. Yip & W.K. Sim (Eds.) *Evolution of Educational Excellence: 25 Years of Education in the Republic of Singapore*. Pp.157-186.

Sim, W.K., Khoo, P.S. & Kanagasabai, S. (1972). *Studies in micro-teaching.II. Effects of incorporating micro-teaching into macro-teaching*. *Jurnal Pendidikan [Journal of Education]*,3, 11-41.

Sim, W.K. et al. (1973). *A Position Paper on the Evaluation of Science and Mathematics Education in Relation to the Mid-term Review of the Third Malaysia Plan (1971-1975)*. Final Report. Malaysia: University of Malaya. 133pp.

Sim, W.K. & Yeoh, O.C. (1976). *Value Orientation of Farmers Towards Change in Peninsular Malaysia*. Final Report. Malaysia: MCDS. 283pp.

Walker, J.C. & Evers, C.W. (1988). *The epistemological unity of educational research*. In J.P. Keeves (Ed.) *Educational Research, Methodology and Measurement: An International Handbook*. Oxford: Pergamon Press. Pp.228-36.

## ANNEX 1

### FARE #1: Use of item response theory in pupil profiling

Item response theory has been found to be a more powerful and useful latent trait model for analysing test data than classical test theory. While some psychometricians have advocated the use of three-parameter models, Benjamin Wright and his associates, not only at the University of Chicago but also in several parts of the world, have demonstrated elegance and effectiveness in using the one-parameter model, which is, in effect, the Rasch model, as shown below:

$$p_{mi} = \frac{\exp(\theta_m - \delta_i)}{1 + \exp(\theta_m - \delta_i)}$$

where  $p_{mi}$  is the probability of person  $m$  succeeding in item  $i$ ,

$\theta_m$  is the ability of person  $m$ , and  $\delta_i$  is the difficulty of item  $i$ .

Of particular significance in recent applications of the Rasch model has been the use of partial credit scoring. (Masters, 1982). An equally significant recent trend stems from constructivist epistemology of

learning, which suggests that students construct meaning systems, termed variously as misconceptions or alternative frameworks, for instance, which could interfere with the learning of more useful concepts.

In a pupil profiling project, a battery of tests in Languages, Mathematics and Physical Science was administered to a representative sample of pupils in Primary 5 and Form 2. For each subject, profiling components were developed as sub-tests, e.g. Reading, Writing, Listening and Speaking for Languages, Number, Measurement and Geometry for Mathematics and Structure of Matter, Motion and Light for Physical Science. For the latter, open-ended questions were asked and the responses were scored according to an appropriate marking scheme. For example, for the question on change of state in Structure of Matter, the pupils were told that, in making lemonade, warm water was used to dissolve sugar and, after squeezing lemon into the solution, ice cubes were added. They were then asked why the ice melts quickly. For this question, the answers were marked as follows:

3 marks Responses that clearly show that change of state results from change in the

(1% Pr5, arrangement of particles. This rearrangement results from the addition of more

16% F2) energy in the form of heat.

2 marks Responses indicate that ice and water are the same substance. The particulate

(4% Pr5, model is used to illustrate this distinction, but the role that heat plays in the

15% F2) change is not explained.

1 mark Responses indicate that pupils are aware that ice and water are the same substance  
(43% Pr5, and that heat causes change from one state to another. But there is no awareness  
38% F2) of the particulate model.  
0 mark Uninterpretable responses.  
(52% Pr5, 31% F2)

Partial credit model parameter estimates were computed for the three data sets, using Thurstonian type thresholds. The threshold for a score  $i$  to an item occurs at the point on the continuum where a score of  $i$  or greater is 0.5. The infit and outfit mean squares are the weighted and unweighted mean square fit statistics. Below, for example, are the partial credit model estimates for the item on Change of State in the data set on Structure of Matter:

ITEM NAME	SCORE	MAXSCR	THRESHOLDS			INFIT	OUTFIT
			1	2	3		
Change of State	583	1988	-.93	.67	.97	.91	.87
			.11	.14	.18		

Reference Masters, G.N. (1982). The Rasch model for partial credit scoring, *Psychometrika*, 47, 149-174.

## ANNEX 2

### FARE #2: Non-intuitive factors associated with quality of education

The present study originated from a meeting which the Minister of Education had with representatives of teachers' associations. He concluded from the meeting that school personnel tended to equate "quality of education" with their students' performance in public examinations. He also decided to look into their suggestions for improving the quality of education, namely:-

1. The per capita expenditure should be increased so that schools will be able to invest in more sophisticated technology, which would otherwise be beyond their reach.
2. The size of classes should be reduced so that teachers will be able to give more individualised attention to their students.
3. The provision of sports facilities in schools should be enhanced, so that students will be more physically fit and healthy to cope with the pressures of schooling.
4. Teachers' salaries should be increased so as to bring about greater job satisfaction among teachers and lower the discrepancies between their income and that of their contemporaries who have joined other professions.
5. Better qualified teachers should be employed, or else teachers should have ample opportunities to upgrade their qualifications, so as to improve the quality of education.

6. Teachers' workload should be reduced, so that they will have time to reflect on, and to improve, their teaching.

In order to arrive at an equitable decision, the present study was conducted. Essentially, a number of indices, with the school as the unit of analysis, were developed as independent variables as follows:

1. Per capita expenditure (PE)
2. Class size (CS)
3. Sports facilities (SF)
4. Teachers' salaries (TS)
5. Teachers' qualifications (TQ)
6. Teachers' workload (TW)

The following public examinations were employed as dependent variables, again with the school as the unit of analysis, so that only the mean scores of students who have sat for the particular examination(s) concerned are used:

1. PCE
2. BJCE
3. GCE'O'
4. GCE'A'

Using the entire population of schools, the following intercorrelation matrix was obtained:-

	PE	CS	SF	TS	TQ	TW	PCE	BJCE	GCE'O'	GCE'A'
CS	.08								* .05 level	
SF	.35**	-.18*								
TS	.28**	-.11	-.09							
TQ	.30**	-.12	-.13	.46**						
TW	-.15	.26**	.11	-.24**	-.33**				** .01 level	
PCE	-.17*	.29**	-.04	-.07	-.18*	.28**				
BJCE	-.22*	.31**	-.16*	-.11	-.22*	.33**	.56**			
GCE'O'	-.49**	.21*	-.28**	-.28**	-.35**	.21*	.26**	.61**		
GCE'A'	-.30**	.04	-.11	-.16*	-.17*	.18*	.10	.32**	.50**	

Based on the unexpected results showing the consistently negative, or consistently positive, correlations between each of the independent variables and each of the dependent variables (as shown in the bold figures in the rectangular area of the intercorrelation matrix), it was recommended that the Minister should not accede to the suggestions of the representatives of the teachers' associations. It was further recommended that, as far as possible, per capita expenditure, sports facilities, teachers' salaries and teachers' qualifications should be progressively reduced while class size and teachers' workload should be progressively increased.