

## U.S.M.'s Project InSPIRE: A Study into the Problems of Teaching and Learning in Selected Rural Primary Schools

Hulman Sinaga  
Pusat Pengajian Ilmu Pendidikan  
Universiti Sains Malaysia

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Tujuan asas kertas ini ialah untuk memperkenalkan secara kasar apakah yang dilakukan oleh Universiti Sains Malaysia dalam bidang kajian kurikulum untuk menentukan cara-cara membaiki pendidikan sekolah rendah menerusi Projek InSPIRE. Kertas ini ditulis dengan mengemukakan huraian ringkas berhubung dengan beberapa aspek daripada Projek ini, seperti, pengenalan, tujuan, asas-asas andaian, rancangan, pengembangan alat-alat pengajaran, hasil-hasil yang telah tercapai hingga kini, bahagian-bahagian aktiviti Projek dan asas struktur organisasinya. Projek ini sedang memasuki peringkat kajiuji dalam bulan Januari 1980 dan dijangka akan siap menjelang bulan Disember 1982. Adalah diharapkan bahawa dalam jangka masa itu, Projek ini akan memperolehi maklumat-maklumat yang berharga berhubung dengan pengenalan sistem pengajaran corak baharu di beberapa buah sekolah rendah pilihan di luar bandar yang merupakan tempat kajiuji itu dijalankan.

### Its Beginnings

The *Dropout Study*, published in 1973, has brought to the level of concerned consciousness of many crucial problems relating to primary schools in Malaysia. In particular the plight of rural primary schools has attracted the attention of both scholars and decision-makers in government. Motivated by the possibility of making concrete contributions to the improvement of basic education in the country, and spurred by encouragement from colleagues at the Centre for Educational Studies (CES), the author, in late 1974 began to conceptualize a problem suitable for study which would merit funding by some donor agency. By the 28th April, 1975 the first letter exploring the possibility of funding was sent to the Regional Office in Singapore of the International Development and Research Centre (I.D.R.C). That letter was forwarded to Professor Don Simpson at IDRC's head office in Ottawa, Canada, as he was the officer responsible for its programme in educational research. A positive reply in a letter dated May 29, 1975 indicating IDRC's interest in continuing dialogue on a research problem marked the beginnings of purposeful communications between Universiti Sains Malaysia (U.S.M.) and I.D.R.C.

In November 1975 Professor Simpson paid a visit to USM and had discussions with the author and other professional colleagues regarding the proposed study. By December 1975 the author was invited to visit SEAMEO-INNOTECH's Project IMPACT at Cebu City, Republic of the Philippines, to have discussions with researchers there and to see their work on "delivery of mass primary education." That five-day visit proved to be valuable for the preparation of a formal research proposal. By early 1976 some academic staff members of CES indicated tentative interest in teaming up to undertake the proposed research. Two colleagues, Dr. Koh Tsu Koon and Encik Mohd. Daud bin Hamzah became sufficiently committed to the proposed undertaking to become involved in preparing the formal proposal document. On completion of the first draft of the proposal a two-day seminar, funded by IDRC, was convened in Penang on July 13 and 14, 1976, to enable senior Ministry of Education officials together with representatives from IDRC and INNOTECH to carefully study the proposed research and to discuss the necessary guidelines for the establishment of a research and development (R & D) project. It was during that seminar that agree-

ment in principle was arrived at for Malaysia to conduct an empirical study of the problems of teaching and learning in selected rural primary schools. Subsequent to that conference, further refinement of plans had to be made before a final official request could be made by the Malaysian Government, through its Economic Planning Unit in the Prime Minister's Department, to IDRC. This meant several more months of preliminary preparations. During that period a number of problems surfaced relating to the publication of the Cabinet Committee Report on salaries. However, through the help of many people and in particular through the personal efforts of USM's Vice Chancellor, Tan Sri Datuk Hj. Hamdan Tahir, many of the problems were surmounted. Hence, by July 1977, the Grants Communication document was officially signed by the Director of IDRC, the Vice Chancellor of Universiti Sains Malaysia and the Secretary to the Malaysian Government respectively. It meant in effect that three official agencies – IDRC, Ministry of Education and USM – agreed to provide the necessary material and financial support to the proposed project.

### Its Purpose

It has been pointed out (Murad, 1973; Seymour, 1974) that there are serious problems relating to learning efficiency among rural primary school children. The low level of efficiency is viewed to be the resultant of a complex variety of factors. Among them are poor instructional facilities, prevalence of relatively ineffective instruction and the bringing to school by children of a number of skills inadequately developed at home to cope with the demands of modern schooling.

Hence, the overall purpose of this R & D project is to determine, through quasiexperimental studies, how to raise the learning efficiency of children in selected rural primary schools. But learning efficiency is assumed to relate to two vital factors, viz., the instructional effectiveness of teachers and the learning capabilities of pupils. Thus it becomes an important task to examine carefully the existing process of instruction in selected classrooms and to identify the major constraining factors under which teachers and pupils carry out their work. This is necessary if we are to meaningfully introduce attempts to change both the teaching methods of teachers and the learning behaviours of pupils.

The work done by researchers at Project IMPACT in the Philippines strongly suggests that to rapidly change patterns and practices of teaching and learning, instruction has to be programmed and operationalized towards desired ends. It was thus decided to determine experimentally whether through the introduction of a programmed system of instruction into selected Malaysian primary schools the teaching-learning behaviours of teachers and pupils can be expected to achieve the level of learning efficiency desired. Such a system was to be pre-planned and pre-specified by this project according to selected principles for the purpose of meeting the objectives, agreed upon by the Ministry of Education and IDRC.

These are to:

1. Increase the achievement level of the child in the content areas of languages, social studies, mathematics, science, arts and crafts, physical and health education and music.
2. Develop the ability to direct his own learning. Specifically to assist the child to identify his own needs and interests and develop self-directedness in learning.
3. Understand himself and others in the community and thereby, develop greater social sensitivity and responsibility.
4. Develop to the maximum the cognitive potential of each child. Specifically to facilitate the development of the capacity for both creative as well as objective and systematic thinking.
5. Acquire functional linguistic ability and literacy that would enable the child to participate successfully in the social and economic activities of the society.

Assuming that these objectives are achievable largely through suitable schooling and further assuming the capacity of the Project to control most crucial non-experimental variables, the following hypothesis are among those to be tested.

1. Other factors aside, the learning efficiency of children can be proportionately and significantly raised by the improvement of the quality of instruction.

2. Instruction in those schools can be modified through the programming of the teaching and learning behaviours of teachers and pupils.
3. The quality of the teaching behaviours tends to be influenced by:
  - (a) the educational background of the teachers,
  - (b) the type of professional training undergone,
  - (c) the nature and recency of their professional experience
  - (d) the professional commitment of teachers as well as
  - (e) the nature of programming of instruction provided by Project InSPIRE.
4. The modification of learning behaviours of pupils tends to be influenced primarily by the quality of teaching carried out by their teachers.

### **Its Theoretical Basis**

Any undertaking of this kind has to anchor its activities upon certain basic principles or theoretical underpinnings. A paper of this scope obviously cannot elaborate on all the principles used by the Project. However, in order to provide the discerning reader with the conceptual orientation influencing our efforts, we outline some of them here.

First, it should be noted that a basic concern of the Project is to improve the quality of instruction in line with the humanistic and democratic values held by our society as a whole. Since people are the originators and implementors of development, it follows that people must be the prime objects of development. In other words, we place a strong emphasis on concern for children. The child is precious and needs to be respected, guided and helped in the process of becoming. Furthermore, the Project has a fundamental concern that the school reflects the most acceptable elements of democratic living in its operations by assisting children to experience citizenship at increasing levels of maturity, and helping them as they move through school to achieve a growing independence of thought while increasing their ability for co-operative action, crucial qualities for the development of a cohesive multiethnic society.

Secondly, one of the most powerful ideas beginning to shape educational views and practices to operationalize the above concerns is that of mastery learning. Championed by Bloom (1968) and others (e.g. Block, 1971), its proposition is that all or almost all students can master what they are taught. It further suggests procedures whereby each student's instruction can be so managed, within the context of an ordinary group-based classroom instruction, as to promote his fullest development.

The study of instruction is in effect both a study of how to maximize the development of the learner's mental abilities as well as how to help such a learner to use his abilities to get the most out of his education. For basic views on this, the Project draws largely from cognitive psychology or more specifically from its "informaton processing theory". The men who have untiringly attempted to apply many of the ideas from this field are Klausmier and his associates (1975) and Gagne (1977). In addition, the work of Landa (1974, 1976), a Russian educationist, on devising instructional procedures for developing effective skills for problem-solving is found to be very useful.

A third cluster of ideas focuses on the specific instructional modes which have been conceptualized to put into operation the concerns for children and their individual differences. Here certain leading proponents of modular instruction such as Russell (1974) and peer-mediated instruction such as Rosenbaum (1973) and others have influenced our efforts considerably.

There is a fourth category of thinkers who have a bearing on our work. Their writings have important implications on curricular matters. Their ideas affect the selection and sequencing of content appropriate to the level of the learners. These also provide the particular perspectives for the development of skills and abilities. Among these leading scholars are Landa (1976) with his emphases on algorithmic and heuristic approaches to instruction, Bandura (1969) with his observational (modelling) learning, Piaget (1969) with his widely known theory of intellectual development and Halliday (1974) with his views on the functions of language. These then, are some of the kinds of thinking that have an influence on what we do in Project 'InSPIRE'.

## Its Programme

This project's system of instruction calls for the appropriate use by teachers and pupils of selected strategies and techniques of teaching and learning. How they are to be used will be specified in some detail by this project and where possible routinized to enable teachers and pupils to quickly acquire the new patterns of teaching and learning. These strategies and techniques are in effect mini instructional systems. When programmed and integrated into an overall pattern we call it programmed instruction. Thus this project is experimenting on the use of Integrated Systems of Programmed Instruction (suited for) Rural Environments. It is from this that the acronym InSPIRE is derived.

Because children in the lower primary differ in skills to be developed and capabilities acquired from those in the upper primary, Project InSPIRE (subsequently referred to as the Project) found it necessary to conceptualize two different forms of programming instruction for those two levels.

### Programmed Instruction for Lower Primary

At this level children are expected to develop basic learning skills related to the development of literacy and numeracy. They are neither expected to learn independently nor from their peers. Rather, teaching and management of instruction will be carried out by the teachers concerned according to a programme. This programme postulates that all, or almost all, rural children attending school can learn any given subject to a *mastery level* provided appropriate conditions for learning are created in the classroom and school concerned. It is those "appropriate conditions" of instruction and its management that are to be programmed. The flow chart on next page provides a generalized outline of the nature of this programming. It represents a systematized attempt to apply selected learning and pedagogic principles. And in order to help teachers carry out the Project's form of programmed instruction, they will be provided with instructional booklets for every lesson they need to teach for the first two terms of each year. These booklets are referred to as Programmed Teaching Guides (PTG's). For the third term of each year the teachers concerned will be expected to teach using their individually prepared PTG's. The extent to which their PTG's resemble that of the Project's may provide an indication of the degree of modification of teaching behaviour acquired by them.

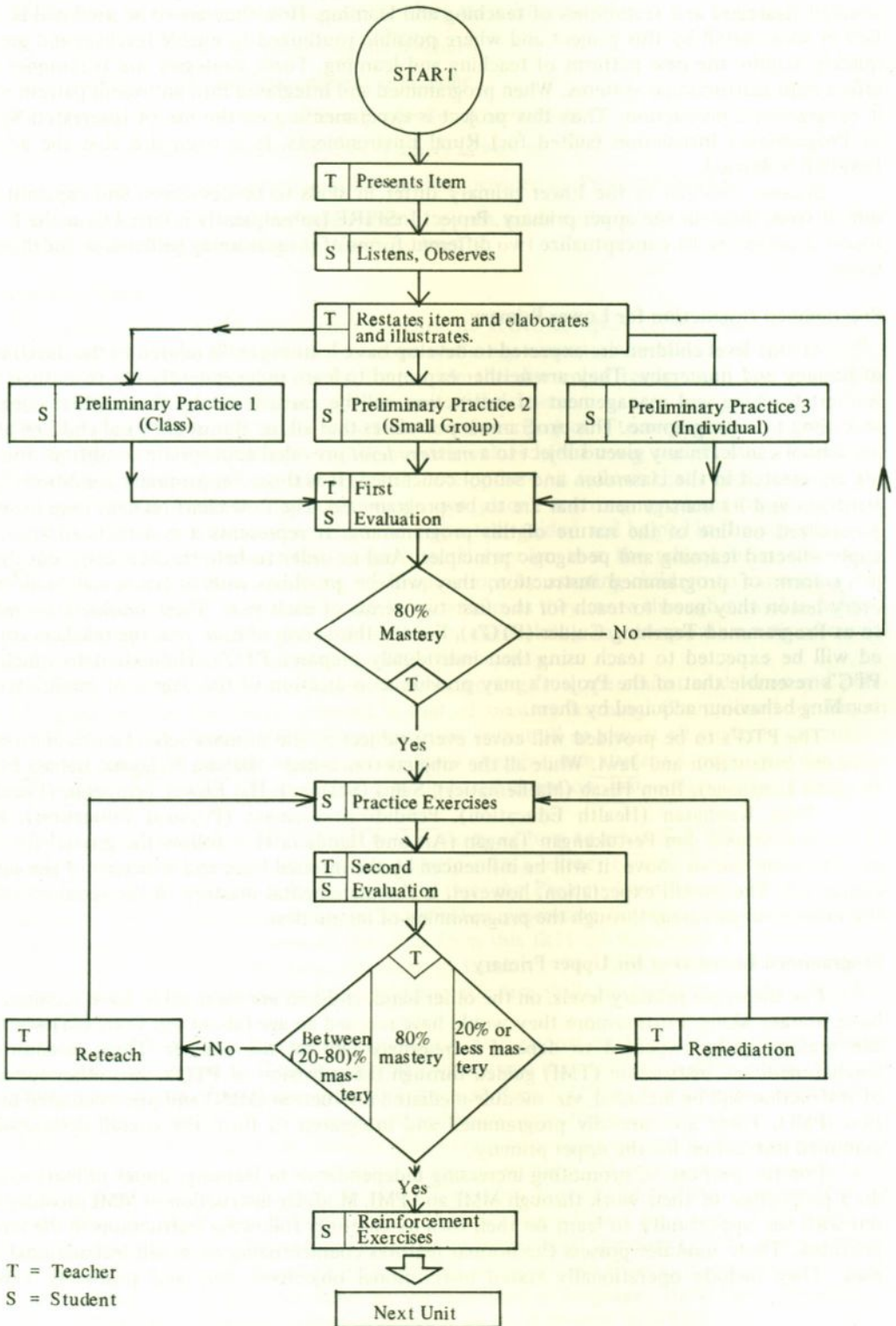
The PTG's to be provided will cover every subject in the primary school curriculum except religious instruction and Jawi. While all the subjects concerned – Bahasa Malaysia, Bahasa Inggeris (English Language), Ilmu Hisab (Mathematics), Sains (Science), Hal Ehwal Tempatan (Local Studies), Ilmu Kesihatan (Health Education), Pendidikan Jasmani (Physical Education), Muzik (Music), Senilukis dan Pertukangan Tangan (Art and Handicraft) – follow the general format of programming shown above, it will be influenced by the internal logic and structure of the subjects concerned. The overall expectation, however, is the incremental mastery of the required skills in the various subject areas through the programming of instruction.

### Programmed Instruction for Upper Primary

For the upper primary levels, on the other hand, children are assumed to have acquired some basic literacy skills. Furthermore they would have reached an age (about ten years old) when they can reasonably be expected to depend increasingly less on the teacher. Thus, in addition to teacher-mediated instruction (TMI) guided through the provision of PTG's, two other sub-modes of instruction will be included, viz. module-mediated instruction (MMI) and peer-mediated instruction (PMI). These are carefully programmed and integrated to form the overall system of programmed instruction for the upper primary.

For the purpose of promoting increasing independence in learning, upper primary children do a proportion of their work through MMI and PMI. Modular instruction or MMI provides children with the opportunity to learn on their own by carefully following instructions in the modules provided. These modules possess the normal features characterizing most self-instructional materials. They include operationally stated instructional objectives, pre- and post-tests, carefully

Instructional Management System for Programmed Teaching (Lower Primary)



worded instructions and so forth. In addition, for the purpose of developing skills in working co-operatively and to increase the potential of guided supervision for each child, PMI is included in the overall experience of pupils. This is actually a programmed system of managing learning, i.e. a system of using existing or adopted materials for reinforcing learning. While doing assigned exercises or activities, children are in turn supervised by their peers. Hence in a period for such an activity children are paired randomly and, for half of that period, one assumes the role of a tutor while the other the tutee. The tutor supervises the tutee in doing the assigned work with the help of a tutor's guide which contains answers or solutions to the exercises. The tutor also is responsible for keeping an accurate record of the tutee's learning progress for that session. Half way through the period, whether the tutee has completed the assigned work or not, the pair exchanges roles. The former tutee now becomes the tutor and PMI continues till the end of the period.

These additional modes of instruction – MMI and PMI – are not to be used independently of each other. Rather they are to be employed both to complement and supplement TMI. In other words, the teacher is in control of the entire learning situation for all the subjects concerned. Guided by the PTG's, he monitors the learning progress of each child and employs TMI, MMI and PMI proportionately according to the plan provided by the Project. In any particular week pupils may be allowed some freedom to progress at their own rate. However, the teacher is expected to ensure that the class progresses as a team as much as possible. Faster pupils may finish their assigned weekly tasks ahead of their peers. Before they will be allowed to begin the next unit of work, however, they will be organized to assist their slower peers. In this way, not only is it expected that pupils learn to work co-operatively but the class will move ahead as a team. Parenthetically, it should be pointed out that experience elsewhere has shown that both the pupils who give and receive such additional assistance benefit from the experience.

#### **Its Instructional Materials Development**

All the above modes of instruction require suitably designed instructional materials. Since these are not readily available in the market, they have to be specially prepared. Thus the Project is obliged to be engaged also, besides research, in the development of the instructional materials needed to test the innovative modes. In effect Project InSPIRE has to prepare about two-thirds of all Programmed Teacher Guides (PTGs) for each of primaries one to three. Similarly for primaries four to six the Project has to prepare about two-thirds of all materials for TMI, MMI and PMI. It is proposed that the balance of the other third of instructional materials for each level will be prepared by the teachers in order to determine the nature of the transfer of learning on the part of the teachers involved.

#### **Its Accomplishment to Date**

As was pointed out earlier the formal document marking the setting up of Project InSPIRE was signed by July 1977. The required professional and support staff were then recruited. By the middle of November 1977 most of these had reported for work. The challenging task of orienting the staff to the purposes and demands of the Project began. The professional staff seconded from the school system to the Project as well as recruited from the private sector consists of six research officers, one editor-cum-administrative officer and eight subject specialists besides the director and his deputy. Everyone of the research officers (degree holders) and the subject specialists (college trained teachers) had no research experience or training prior to joining the Project. It was necessary therefore for them to acquire technical competence needed to conceptualize the desired system of programming instruction and to prepare the suitable instructional materials needed to test out that system. This was done by running many hours of workshops and discussions supplemented by expected reading and individual study. As they attempted to apply their newly acquired ideas they gradually developed the skills needed to accomplish their tasks. This in itself could be considered a major accomplishment. Yet there have been a number of other things thus far undertaken.

An early survey of thirty-six schools in Perak was completed by July 1978. This exercise accomplished at least two things. Firstly, it enabled the fourteen officers to acquire accurate per-

sonal perceptions of the problems of teaching and learning in rural primary schools. Secondly, empirical data about the schools, the teachers, the pupils and other environmental factors were collected through the use of scheduled interviews and questionnaires specially prepared for Project purposes. The collected data has been computer processed and is awaiting final analysis and reporting.

From that original sample of schools, six were finally chosen for in-depth analysis of the process of instruction. Data was collected on a sampling of instruction in a variety of subjects at the primary 1 and 4 levels. The video-tape recorder, audio-tape recorder and other means were used for gathering data. This task was completed by October 1979. The raw data is waiting to be processed and analyzed.

In the area of materials development a considerable amount has been undertaken. Four major categories of materials have been developed. First, the break down and suitable sequencing of content of the official syllabi into small units needed for each of the lessons to be programmed has been done for primary one and four. Each unit is provided with the recommended instructional procedures and instructional aids deemed suited for that lesson. These, the unit content, the recommended instructional procedures and the instructional aids suggested, combined and properly sequenced form useful documents referred to by the Project as Syllabus Programmes. Secondly, PTG's have been prepared in sufficient quantities for experimentation to begin at Primary 1 and 4 in January 1980. Thirdly, modules for Bahasa Malaysia, Bahasa Inggeris, Ilmu Hisab, Sains, Senilukis and Pendidikan Jasmani for Primary 4 have also been prepared in adequate quantities for testing in January 1980. Fourthly, materials for peer-mediated instruction are also being prepared for use beginning January 1980.

Besides instructional materials for experimentation other materials and working papers, including articles such as this have been prepared for training and information.

For the Projects' experimental case studies three schools in the State of Perak have been finally selected. All in all thirty-four teachers and three headmasters are involved. To prepare them to co-operate competently, with the Project in its intended three-year experimentation, a nine-day orientation seminar was conducted from the 12th to 20th November, 1979. This represents the first of a series of three intensive seminars to be conducted for these teachers. During the first seminar the ideas forming the conceptual basis of the Project's programmed instructional system were examined and thoroughly discussed. In the process, all the practical implications of those ideas which participants could think of were openly discussed. Then tentative action plans to overcome potential problems were drawn up.

In brief then the Project has accomplished the following to date:

1. Oriented and trained its staff to do their jobs.
2. Carried out a general survey of 36 schools in the State of Perak.
3. Conducted an in-depth study of the process of instruction in six schools in Northern and Central Perak.
4. Refined and concretized its conceptualization of the programmed system of instruction to be introduced experimentally in three schools.
5. Developed Syllabus Programmes and PTG's for primary 1 and 4, modules and PMI materials Primary 4 together with corresponding instructional aids for them.
6. Prepared working-papers, articles and other documents for training and information.
7. Conducted a nine-day orientation seminar for all the teachers and headmasters concerned.

### **Its Phases of Development**

Up to this point the reader has been incidentally briefed regarding certain schedules of activities of the Project. In order to put matters in their proper perspective and to provide an overall time frame for it a brief description of the major phases of activities is given. In broad terms the Project can be said to have four main phases of development. The first represents the preliminary

phase when the very exploratory thinking and search for a donor agency took place. This was the period between late 1974 and mid 1977. The second phase may be characterized by preparation for and the development of technical competence to conceptualize the problem and to prepare the materials needed to test the formulated programmed system of instruction. This covered the period from July 1977 to December 1979. The third phase will be the experimental phase covering the period between January 1980 and October 1982. Running concurrently during the third phase and likely to continue a few months beyond is the fourth phase. During this time formative evaluation as well as the start of summative evaluation will occur. Also the development and revision of instructional materials will continue during this period. The table below summarizes the four phases of development of the Project.

	Development Phase	Time Frame
1.	<i>Preliminary Phase:</i> Preliminary conceptualization and search for a donor agency.	1974 – 1977
2.	<i>Preparatory and Developmental Phase:</i> Staff training and system and materials development.	1977 – 1979
3.	<i>Experimental Phase:</i> Instructional system try-out, continuing materials development.	1980 – 1982
4.	<i>Formative and Summative Evaluation Phase</i>	1980 – 1982

### Its Basic Organizational Structure

In terms of its organizational structure the Project is a unit of the Chancellory of Universiti Sains Malaysia. The Project itself consists of twelve support staff, eight writers, six research officers cum writers, one Peace Corps volunteer as a Communication Design Specialist, an editor cum administrative officer, a deputy director and director. The director and his deputy, besides their work at the Project, are academic staff members of the School of Educational Studies where they have their teaching commitments.

The director of the Project and his staff are directly responsible to the Vice Chancellor for its progress and development. Other groups, however, provide valuable help in its operation. For instance an advisory committee chaired by the Vice Chancellor himself and consisting of senior officers both from the Ministry of Education and this University, assists the Project by providing policy and other general guidelines for operation. This committee in turn has a sub-committee known as the Technical Advisory Committee which works closely with the Project in providing technical advice and guidance. Then in other operational matters relating to personnel and finance the Project is assisted by the Registry and Treasury departments of USM.

### Conclusion

A basic purpose of this article has been to introduce the reader to what Universiti Sains Malaysia, through its Project InSPIRE, is doing in the area of curriculum research for the qualitative development of primary education. In this effort brief descriptions have been provided regarding its beginning, purpose, programme, instructional materials development, accomplishments to date, phases of development and its basic organizational structure.



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