ICT IN EDUCATION - AN ACTION LEARNING APPROACH USING SOFT SYSTEM METHODOLOGY

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ABSTRACT

This paper attempts to explore an effective way to implement ICT learning programmes in Malaysian schools. It is assumed that one of the main factors that might hinder the implementation of the programmes could be teachers' resistance to the adoption of new technologies in school curriculum such as ICT. To overcome the problems, the paper suggests that schools could adopt an action learning approach using soft system methodology. By examining past literatures, the paper pointed out that action learning could have many advantages over traditional learning methods. Traditional learning is based on programmed knowledge while action learning is work related, results based, group focused and using preferred learning style. Action learning also provides experiential learning through practice and formulation of action plans. Soft System Methodology is proposed to be incorporated into the ICT learning programme as a preferred methodology because it is closely linked to action learning. SSM solves problems through collaborative effort, action taking and reflection, similar to action learning. SSM aims to bring about improvement in areas of social concern by activating the people involved in a learning cycle. Learning takes place through the iterative process of using systems concepts to reflect upon and debate perception of the real world, taking action in the real world and again reflecting on the happenings using systems concepts. A framework that fused SSM and action learning together was proposed in the paper and illustrated in a diagram. Finally, the paper discusses the pitfalls of action learning as well as factors that could contribute to successful implementation of an ICT action learning programme.

INTRODUCTION

In the past decade, there is a growing trend of incorporating Information and communication technology (ICT) into the curriculum of Malaysian schools. The aim is to prepare teachers and students to face the challenges brought about by the rapidly changing environment dominated by the revolution of the information and communication technology. In fact, the ministry of education has started a pilot project known as the smart school programme in order to improve ICT literacy among teachers and students. This programme has been implemented in 90 selected schools throughout Malaysia since 1999. However, due to financial constraint and other factors, most schools were not included in this project. However, since then most schools were equipped with ICT hardware consisting of computer laboratories and computers but they are supposed to run their own ICT programmes without qualified ICT teachers.

Indeed, most principals of the schools would like to implement ICT in the school curriculum. Before the implementation of an ICT programme, we need to identify potential problems and issues that could jeopardize the programme. Although it is quite impossible to figure out all the issues before the implementation of the programme, there is one critical issue perceived by the author that needs to be resolved. This issue is that most teachers may not be in favour of the ICT programme because of the lack of confidence and knowledge in dealing with ICT. In order to resolve this issue, the author thus propose to start an action learning programme to facilitate change of attitude towards ICT learning among the teachers, with the aim of achieving group learning. It is hope that with this change of attitude, the group learning dynamic will motivate the teachers to embrace ICT and eventually attain organizational learning in the field of ICT. The ultimate objective of the action learning programme is to cultivate a proactive learning culture in ICT among the teachers so as to create a conducive environment for the implementation of the ICT programme in schools.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Three assumptions were put forward to support the proposal:

(i) Most of the teachers are having negative attitudes towards the use of ICT in teaching and learning and this could affect the implementation of the ICT programme in schools.

(ii) The Existing staff development programme in ICT are not effective in preparing teachers in terms of skill , knowledge and confidence to cope with challenges that come with the implementation of ICT programme in school.

(iii) Action learning could be incorporated into the staff development programme in ICT so that teachers are more receptive towards learning and hence could acquire ICT skills and knowledge better. Teachers will then be better prepared to manage ICT programme in school.

In order to find out whether the above assumptions could be justified, let's review some of the recent works in dealing with the above issues.

RESISTANCE TO ADOPTION OF COMPUTER TECHNOLOGY

According to a study by Hodas(1993), any new process or technology being introduced into an organisation that are perceived to be potentially disruptive to existing practices or structures will normally meet with great resistance from the people in that organisation. He further pointed out that school culture has been conservative and relatively unchanged over the years. In addition, school teachers are normally contented with the predefined and preexisting job. Therefore, understandably teachers would tend to be skeptical towards any changes brought about by new technologies. Besides, Howley et al(1993, cited in Hodas) reported that teachers not only read less than normal middle class people but they often prefer reading popular materials rather than research journals. This implies that teachers have less intellectual aptitude and limited scope of knowledge that could explain why generally teachers are reluctant to acquire new skill set necessary to be proficient with new technologies such as ICT. Another aspect that could be related to resistance to new technologies is

concerning self-respect. Hodas(1993) indicates that there is fear in the heart of teachers that computer could replace them in most activities. This could damage their self image badly therefore new technologies such as ICT are not welcome. Further more, ICT are perceived by teachers to be not suitable or flexible enough to be use as teaching tool in the present classroom setup.

In another study, Krysa(1998) tried to identify factors that might affect the adoption of computer technology in schools and he found that the most significant factor is teachers' attitudes towards computer technology. Lidtke in 1979 (cited in Madden1989, Krysa 1998) suggested that the lack of enthusiasm towards the use of computer technology is due to factors such as anxiety in dealing with computer equipment, feeling of losing control in teaching using ICT, not enough technical support, too much time and effort needed in training. In similar studies about teachers' attitudes towards technology, Planow, Bauder, Carr and Sarner in 1993(cited in akbaba and Kurubacak 1998) indicated that the development of technological instructional tools is affected by teachers' attitudes towards these tools and their capability in using them effectively. Indeed, many teachers are facing difficulties in using technologies effectively and efficiently in teaching and learning. In another recent research conducted in Malaysia, Norhayati(2000) found that if teachers think that the computer technology does not serve their own or their students' needs, they will strongly oppose any proposal to implement ICT project in school. According to the findings in Norhayati' study, teachers have many concerns regarding the use of ICT in classroom teaching, notably those related to time, software and management. If these concerns are not attended promptly, this would hamper the implementation of ICT programme in schools. Many teachers surveyed in Norhayati's research have expressed concern that they do not have enough time to make preparation for lessons using computer as they have to teach some other subjects and carry out other activities. Perhaps, the best statement that could sum up the reluctance of teachers to embrace ICT in teaching and learning is the one put forward by Kazlaukas and Koop in 1995(cited in Krysa 1998) :

' A critical factor that all staff needed to recognize and understand that integrating computers into classroom practice is a complex innovation which requires change to the whole school's practices and culture, to the curriculum, and in teacher's attitudes and classroom practice. Such change is achieved incrementally over a long period of time' (p.2)

WEAKNESSES IN EXISTING STAFF DEVELOPMENT PROGRAMMES IN ICT

Having understood some of the factors that affect the adoption of Information and communication technology in schools, where teachers' attitudes stood out significantly, we need to examine whether the existing staff develpment programme related to ICT is effective enough to change teachers' attitudes and behaviours towards using ICT in school and hence would be able to use computer technologies confidently and effectively.

A recent study by Norhayati(2000) shows that most in-house staff development programmes related to computing do not achieve the purpose of learning because the designers of the programmes fail to study the background of the teachers in terms of their attitudes, concerns and skills in computing. McKenzie (1991) in his recent study pointed out that traditional staff development programmes have poor track records. The poor track record was partly due to lack of necessary support from local education departments and partly due to insufficient understanding of the necessary elements required in order to make the programme successful. According to Mackenzie (1991), most teachers' training workshops did not provide enough opportunity for teachers to practice their newly acquired skills and fail to provide continual follow-up support for the teachers. On the other hand, Mackenzie (1991) pointed out that even though some of the staff development programmes in ICT may have been considered successful, the improvement is only incremental and many of these programmes were only adding on to the core of the teachers rather than redesigning the core itself. In view of the fast changing world especially in the field of ICT, such incremental improvement is no longer adequate. Therefore, McKenzie (1991) suggested that there should be a radical shift in the nature of staff development programme. Based on some of the above findings, most existing staff development programmes for teachers in information and communication technology are ineffective. Worse of all, existing staff development programmes in introducing new technologies 'do little to ignite the passions or harness the deeply held beliefs of individual teachers.'(McKenzie 1994, p1)

Therefore, we need to redefine and redesign our staff training programmes in order to effectively help teachers to acquire knowledge, skill, and better mindset in dealing with the fast changing information and communication technology. So, what kind of programmes do we need? Mckenzie(1991)

has some good suggestions. He briefly suggested that staff development needs to have the following characteristics:

Staff development should be;

- offering immersion and transformation
- inspiring teachers to invent
- experience-based and learning from doing and exploring
- considering the feelings, fears and anxieties of the learners

The above characteristics closely resemble those of action learning, which features real-life problems solving, participatory and collaborative learning, continual reflection and cyclical learning process. In order to find out whether action learning could alleviate the weaknesses and problems of the existing staff development programmes in ICT, let's review some of the recent studies on action learning.

ACTION LEARNING IN STAFF DEVELOPMENT

Some recent studies had shown that action learning could be incorporated into staff development programmes in order to deal effectively with learning rapidly changing technologies such as ICT. Ellis and Phelps(2000) reported that action learning is currently an important staff development model especially in collaborative learning and change management. Howell(1994) also pointed out that action learning has gained popularity among managers because the action learning programmes are work related, results-based, group-focused and cater for the preferred learning styles of the participants. In another study, Spence (1998) illustrated some useful applications that have been used in individual and organizational learning, among them are:

- to solve non-technical problem in a small group.
- to facilitate team work among managers.
- to bring about personal development
- to increase productivity
- to increase effectiveness in public service department

Haddock in 1997(cited in Spence) also reported that action learning has been conducted successfully in nursing education. In addition, Wills in 1998(cited in Spence) show that 'action learning has been used in

university human resource department gradute programs to help students more creatively apply HRD principles to real-world problems.'(p2). Further more, Beaty, Lawson, Bourner and O'Hara(1997) stressed that action learning is very suitable for professional and personal development because it provides the opportunity for experiential learning through practice and for development of action plans. Beaty et al(1997) further reported that through their observation that the participants learnt a lot in the action learning process.

Based on the above review of recent works, it is concluded that the three assumptions are reasonably well justified. Therefore, it is proposed that the ICT training programme shall use the action learning approach.

METHODOLOGY

THE ACTION LEARNING APPROACH

Before implementing the action learning programme, it is important to understand what action learning is all about. Let's begin by examining its background and some of its many definitions and characteristics.

i. BACKGROUND

According to Raelin(1997), the first person to incorporate the idea of 'action' as means of conducting systematic inquiry in doing research is Kurt Lewin. Abraham, Arnold & Oxenberry(1996) further pointed out that Kurt Lewin is the founder of action research. On the other hand, Raelin(1997) stated that the founder of action learning is Reg Revans . Action learning was actually evolved from action research. Mumford in 1985(cited in Abraham et al., 1996) suggested that action learning was evolved out of ' the product of Revan's experience, thought and dynamism'(p 64). Abraham et al.(1996) stated that Revan first used action learning in 1945 in a report related to the set up of the staff college for the British coal industry. However, according Revans(Abraham et al. 1996, p14), the concept of action learning was not popular until the middle of 1970's. From then on, it is well accepted as a learning tool for the management circles in business and the private sectors.

ii. DEFINITIONS AND CHARACTERISTICS.

Although action learning has been established since 1945, it is still difficult to define action learning clearly. According to Revans(1997, p3), 'Action learning takes so long to describe, so much longer to find interesting, and so much longer still to get started because it so simple.' However, the following definitions should sufficiently described what action learning is. McGill and Beaty in 1995(cited in Spence 1998) defined action learning as " a continuos process of learning and reflection, supported by colleagues, with the intention of getting things done"(p.21) . Similarly, Inglis in 1994 (cited in Spence, 1998) defined action learning as 'a process which brings people together to find solutions to problems and, in doing so, develops both the individuals and the organization"(p3). In addition, Revans(1982) illustrated AL with the equation L=P+Q where L represents learning, P is programmed knowledge while Q is questioning insight. Another variation is suggested by Inglis 1994(pp9-10 cited in Arnold, Oxenberry and Abraham 1996) L=P+Q+I, where I is implementation which means action. The author suggest another model which is L=P+Q+S, where S represent skills because learning could include some technical training.

To differentiate action learning from non action learning, Day (1999) pointed out that action learning is not the same as project work which usually ends up with suggestions but no action, job rotation which often comes without responsibility, case study , business game, simulation and etc. On the other hand, Inglis(Spence 1998, P1) illustrated the following characteristics of action learning :

a. Learning is centered around the need to find solution to a real problem.
b. Learning is voluntary and learner driven.
c. Individual development is as important as finding the solution to the problem
d. Action learning is highly visible, social process, which may lead to organizational change.

In addition, according to Garratt(1987) , the main objective of action learning is to focus on individual and group development.

THE ACTION LEARNING PROCEDURE

The procedure for an ICT action learning programme of schools could be formulated as follows:

i. Clarify the objective of the action learning programme. The objective of an ICT action learning group of a school is to help group members to overcome initial fear and negative attitude towards ICT , ultimately achieve effective learning in ICT through participatory and collaborative learning process. It is hope that the change of attitude of the ICT action learning group towards learning ICT will create a conducive environment for the whole staff of the school to master ICT in teaching and learning in the future.

ii. Identify the issues and problems in relation with the implementation of ICT programme in a school, including the action learning programme itself and individual problems of the action learning group.

iii. Generate ideas and possible solutions to the above issues and problems through group participation and collaborative effort of the action learning group.

iv. Take actions to instill desirable changes or solve problems based on the solutions and ideas generated.

v. Conduct review and reflection of the whole process

vi. Repeat the whole cycle if necessary.

SSM AS A METHODOLOGY UNDER ACTION LEARNING

It is proposed that Soft system methodology to be incorporated into ICT action learning programme of A SCHOOL. The rationale of using SSM could be based on a statement provided by Bulow in 1989(cited in Checkland 1999, p.28) where ' SSM is a methodology that aims to bring about improvement in areas of social concern by activating in the people involved in the situation a learning cycle which is ideally never-ending. The learning takes place through the iterative process of using systems concepts to reflect upon and debate perceptions of the real world, taking action in the real world and again reflecting on the happenings using

systems concepts.' Further more, Checkland (1999, p28) pointed out that ' SSM is intrinsically a collaborative approach.' The statements clearly show that SSM is closely linked to action learning in terms of real world problem solving through collaborative effort, action taking and reflection. Therefore , SSM is particularly suited for an ICT action learning programme

The choice of using SSM could be further justified through the review of Checkland's work. According to Checkland(1991), any research will normally contains three element, namely a framework of ideas(F), which are applied in a methodology(M) to inquire into some area of application (A). In action research, A is usually related to ill-structured management problems which has lately included information system, and M is the Soft System Methodology which has replaced systems engineering as the preferred methodology. F is systemic in nature and it include the idea of human activity system. Since action learning uses the basic principle of action research, therefore it is recommended that SSM to be incorporated as a methodology in an ICT action learning programme.

THEORETICAL FRAMEWORK OF SSM

Checkland (1988) stated that SSM is a systems methodology that could be used as a research strategy to bring about improvement in a problem situation. In addition, Travis and Venable (n.d) suggested that SSM is a method of thinking that could help problem owners to carry out purposeful action. it is used to deal with complex problem situations. Travis et. al(n.d) further stressed that the goal of SSM is to bring about improvement of the social condition in a non-prescriptive way. On the other hand, the learning process using SSM needs to be cyclical and reflective in nature. The learning cycle related to SSM involves taking initial purposeful action, gain new experience from the action and result in new experience-based knowledge. Based on this new knowledge, the whole cycle could start again.

The core idea underpinning SSM is systems thinking. Checkland(2000) suggested that the popular phrase 'The whole is more than the sum of its parts' is a good explanation of the concept of systems thinking. Systems thinking essentially means to see the world or an entity as a whole rather than its individual parts. These parts are known as 'emergent properties' of the whole which by themselves are meaningless and could not be used

to understand the whole. According to Checkland(1998), systems thinking defined a whole as an entity that have emergent properties and a hierarchical structure which could survive in a changing environment through a communication and control process. A Human activity system proposed by Checkland (2000) is such example of a whole, or known as a holon .

In the case of the ICT action learning programme of a school, there is need to employ systems thinking in order to analyse the situation related to ICT implementation in the school in a holistic manner. We need to define the relevant systems that would carry out purposeful activities that are related to ICT implementation within the action learning programme. The formulation of this relevant system is part of the seven-stage inquiry process of SSM.

THE SEVEN-STAGE INQUIRY PROCESS OF SSM WITHIN AN ICT ACTION LEARNING PROGRAMME

According to Checkland (1999), the seven stages of inquiry of SSM are:

- Finding out the problem situation which is considered problematic
- Expressing the problem situation through rich pictures.
- Formulate root definitions for selected relevant systems.
- Building conceptual models of the systems(holons) named in the root definitions.
- Comparison of the conceptual models with the real world.
- Determine the kind of changes which are systemically desirable and culturally feasible.
- Take action to improve the problem situation.

The proposed ICT action learning programme shall be integrated with seven-stage of SSM as follow:

PROBLEMS AND ISSUES IDENTIFICATION

The identification and finding out of issues and problems in the perceived problem situation in stage 2 of ICT action learning coincides with stage 1 to stage 2 of SSM. At this stage, the author as the facilitator of the action learning group (ICT committee members) will try to find out possible issues and problems related to the implementation of an ICT programme in a school, including the action learning programme itself. Although the

main concern is the perceived negative attitudes among the members of the ICT action learning group, Information of various kinds from various sources should be gathered because the underlying cause of the negative attitudes might be cultural or political in nature. The information and data gathering methods may include

i. Observation

The areas to be observed should include various activities in school including staff meeting, informal conversations among the teachers, teaching and learning, non-verbal language like gestures of teachers and etc. Information and data collected could be recorded in an informal anecdotal form.

ii. Focus group interview

The focus group interview should be semi-structured or unstructured and conducted in a free flowing manner. It should be conducted for the members of the ICT action learning group first then extend to other teachers.

iii. Self-administered questionnaire

The questionnaire could be designed in the form of checklists, rating scales, multiple-choice questions, open-ended questions, and so fort. It should be administered to the members of the action learning group first then to be extended to the whole staff.

iv. Secondary data analysis

Analyze documents including past reports on ICT training, past ICT projects, accounting records on ICT expenditure and other ICT-related documents.

Information and data gathered above can then be summarized and expressed in the form of rich pictures. According to Checkland(1999, p 288), rich pictures are 'pictorial/diagrammatic representations of the situation's entities (structures), processes, relationships and issues.' The reason for using rich picture is that 'human affairs reveal a rich moving pageant of relationships, and pictures are a better means for recording relationships and connections than is linear prose.'(Checkland 1999, p 45) Through the use of rich pictures, group members will have a better understanding and insight of the various relationships, value judgments and other real-life issues exist within the school community, including the ICT area.

GENERATE IDEAS AND POSSIBLE SOLUTIONS

After gathering information and drawing rich pictures, the group can then proceed to stage 2 of the action learning progamme which can be loosely corresponds to stage 3 , stage 4 and stage 5 of SSM. At this stage, the action learning group will conduct meetings and workshops to generate new ideas in formulating and naming various relevant systems and then come out with corresponding root definitions based on the CATWOE concept, where C =customers, A=actors, T=transformation, W=Weltanschauung(world views), O=owner and E=environmental constraints. After that, conceptual models of the named relevant systems could be constructed and then use them to compare with the real world. Both root definitions and conceptual models are helpful tools that could serve as guides to improve the problem situation. According to Checkland(1999), a root definition always explains the main objective of an activity system and the transformation process that is necessary to achieve that objective. On the other hand, the visual nature of a conceptual model will help participants to understand the relevant system based on the root definitions better. Therefore, ideas generated and expressed as root definitions and conceptual models could provide members of the action learning group an insight into possible solutions so as to improve the problem situation.

TAKE ACTIONS TO INSTILL DESIRABLE CHANGES OR SOLVE PROBLEMS

After generating new ideas and possible solutions using conceptual models, the action learning group will then proceed to formulate action plans to instill changes that are systemically desirable and culturally feasible, which correspond to stage 6 of SSM. After that, the group will implement the action plans so as to bring about changes that might improve the problems situations, which correspond to the final stage of SSM.. Here is an example of such action plans. If the conceptual model is to change teachers from reluctant users to proactive users of ICT, the action plan could includes designing and customizing ICT training course contents suitable for the existing skill and knowledge level of the members of the action learning group.. The training programme should progress slowly with something less technical, interesting and related to their existing experience and knowledge. This is to help them to overcome the fear of computer technology. In other word, they should be allowed to do something which they are familiar with. The course should be designed with great flexibility in terms of its contents and time duration.

Conduct ICT training course for the members of the action learning group based on the above course contents. The training should employ interactive and inquiry approach. Group members are encouraged to help each other and exchange ideas to achieve collaborative learning.

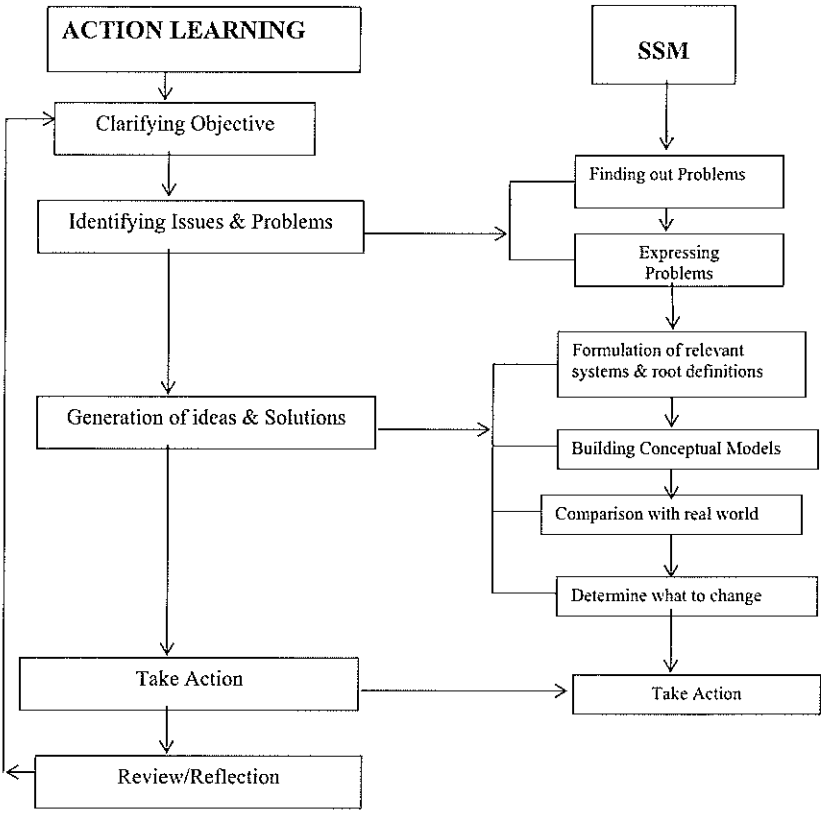
Conduct discussion sessions to evaluate the training course. Members of the ICT action learning group could share and reflect on their learning experiences, give constructive criticisms regarding the training course and suggestions for any modification to improve on the training course, repeat the training course if necessary with a modified course contents based on members recommendations .

CONDUCT REVIEW AND REFLECTION OF THE WHOLE PROCESS

After completing the first round of the action learning programme, members of the action learning group will conduct review and reflection sessions to evaluate the whole action learning process in terms of its effectiveness, contributions and benefits of new knowledge acquired to the members, group and the organisation, new issues and problems that might appear and etc. The group may decide to conduct another round of action learning if deemed necessary. This stage could be linked to the iterative nature of SSM.

The integration of Action Learning and SSM is shown in figure 1.

Figure 1: SSM within the Action Learning Framework



TIME SCHEDULE

The proposed action learning programme shall be conducted over a six month period. By then, the members of the action learning group should be reasonably competent to manage ICT-based teaching and learning programme in school. However, the whole action learning programme is designed to support continual learning and therefore the programme should be iterative. It should be carried on until the objective of learning is achieved. In fact, the action learning group should even review the objective from time to time in order to adjust to the changing environment.

DISCUSSIONS

Although action learning is viewed positively as the best learning programnme for the ICT , we must be beware of some of the pitfalls and negative aspects of it. According to Spence(1998, p.2), there are three concerns related to action learning:

a. Concerns about its misinterpretation
b. Concerns about the methodology itself
c. Questions about its effectiveness.

Wallace (Spence 1998) also expressed his doubt about whether it is advisable to encourage group members to explore unfamiliar problems in order to achieve improvement. In addition, Pun(Spence 1998) pointed out that action learning may be difficult to implement in authoritative culture of education. Further more, Spence(1998) reported that there is no adequate evidence that action learning can actually improve performance.

One aspect that is crucial for the success of the action learning programme is to have full support and recognition from the organization, especially from the top management. According to Lawson, Beaty, Bourner and O'hara(1997), members of the action learning group should be given freedom and permission to ask questions, including those sensitive and difficult ones. Lawson et. al(1997) further elaborated that an organization that permits critical questioning approach will motivates people to create new and innovative ideas thereby will encourage and lead to organizational learning. Therefore, it is important that the principal and teachers of A SCHOOL give their full support and commitment to the ICT action learning programme.

On the other hand , SSM might not be effective if members of the action learning group could not accommodate each other worldview. According to Flood & Jackson (1995), it is quite difficult to change people's worldview based on SSM. Therefore, it is important for the action learning group to try to adjust to each other thinking and values so that mutual and collaborative learning is possible. In addition, Lawson et. al(1997) also pointed out that this kind of accommodation is needed especially in a highly bureaucratic organization because the norms and values of the employees might hinder action learning.

CONCLUSION

The implementation of the ICT programme in a school will have a profound impact on the whole organization. To ensure success of the programme and to achieve strategic change in favour of the schools, this proposal has recommended action learning programme to deal with various issues and problems that might arise and to prepare competent staff to manage the ICT programme. This proposal has also suggested SSM to be incorporated into the action learning programme as it has been proven as one of the effective methodology that could deal will ill-defined and complex problem situations of the human society (or human activity system). Further more, SSM could help to bring about systemically desirable and culturally feasible change which will improve the problem situation.

To ensure success of an ICT action learning programme, the top management and all teachers of the school will need wholeheartedly support the programme and fully commit themselves the programme. It is hope that the success of the programme with contribute to the effective integration of ICT into the curriculum of all the schools in Malaysia.

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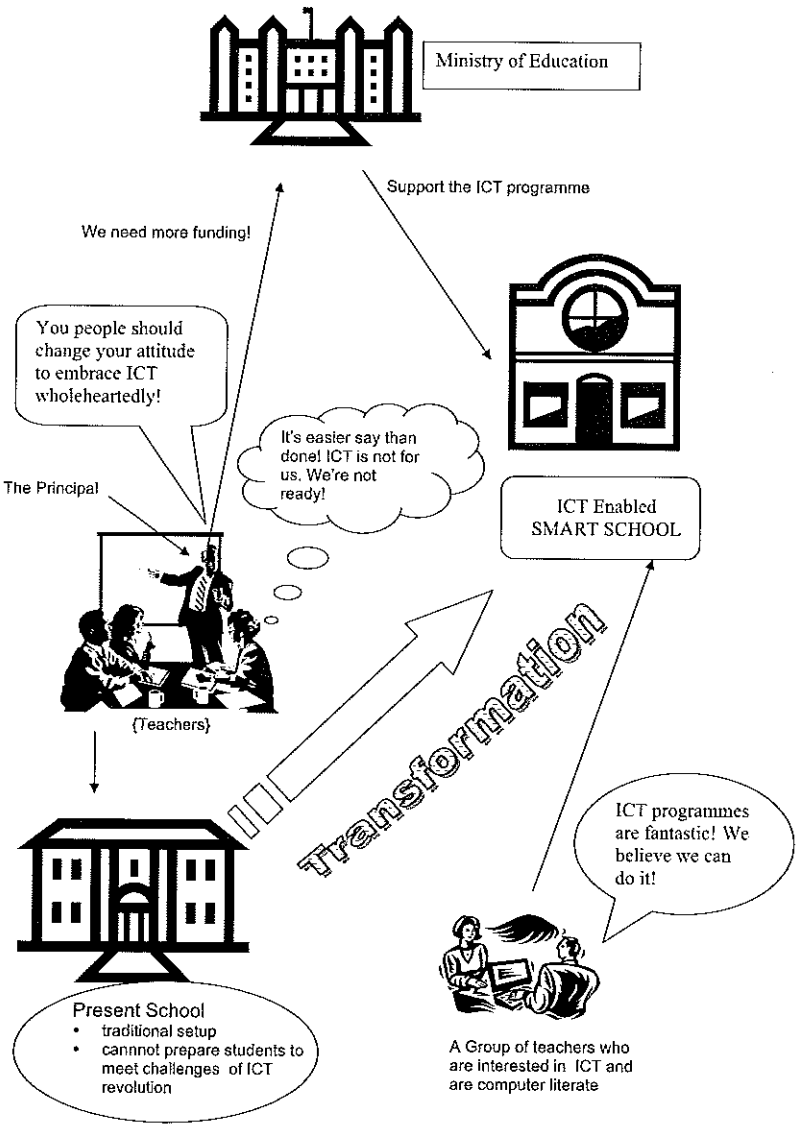
Appendix 1

SAMPLE RICH PICTURE



Appendix II

Conceptual Model of an ICT learning system based on the root definition

Root Definition

A school-owned information and communication technology staff training and development system to help the staff of A SCHOOL to acquire ICT knowledge and skills and become competent in managing ICT programmes in school.

C	Teachers of the school
A	ICT committee members
T	Teachers need to become competent in ICT - Competent ICT teachers
W	Teachers could be trained to become competent in ICT
O	Administrators and Teachers of the school
E	The conservative culture of the school and its teachers.