

# **A CRITICAL SYSTEMS PERSPECTIVE ON RESEARCH METHODOLOGY FOR RESEARCH IN E-LEARNING IN INFORMATION SYSTEMS CLASSES**

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## **ABSTRACT**

The aim of this paper is to provide a critical systems thinking perspective on e-learning research in information systems classrooms. Many higher education practitioners are under pressure from their institutions to do research and to publish their findings. Higher education institutions spend large amounts of money on freeing up lecturers' time for research by incorporating better technology in teaching. Many also believe that the so-called generation-Y students can learn only when they are using technology. This leads to three problems: firstly, the class-room becomes a research centre; secondly, average quality research papers are written; and thirdly, technology drives teaching practices and not the other way round. Although these are often viewed as three independent problems they can be addressed as symptoms of one single problem: We struggle to find a method to reflect on and design our teaching practices in a way that truly benefits our students, the information technology industry and the scholarly community we are part of. Overall the motivation for teaching and the motivation for research about teaching become blurred and move away from most lecturers' original motivation for entering academia.

This paper uses critical systems thinking to motivate critical social theory as an appropriate research paradigm and action research as research methodology for research projects in e-learning in information systems classrooms. It reflects on teaching of information systems and using e-learning from a critical systems perspective. Doing research in e-learning in an information systems classroom is viewed as a pluralist-complex problem with some coercive characteristics according to the Flood and Jackson categorisation. Critical social heuristics is used to better understand the different worldviews and associated objectives in the problem situation.

Action research is viewed from the perspective of critical social research therefore the guidelines for critical social research in information systems developed by Myers and Klein are applicable. Key to such an application of action research is the use of a critical theoretical framework or theory to guide intervention as illustrated by the depiction of action research of Peter Checkland. This paper explores suitable educational theories to guide intervention in information systems classrooms what will be beneficial to different groups of interest as identified in the application of critical social heuristics. It aims to address the problems stated above by providing guidelines for good research in the e-learning discipline.

**Keywords:** critical systems thinking, action research, information systems education, e-learning

# **Critical Systems in Information Systems Education Research Methodology**

## **INTRODUCTION**

The aim of this paper is to reflect on e-learning research in information systems from a critical systems perspective. Critical systems thinking promotes reflection and emancipation. In an environment where quantity is more important than quality lecturers in developing countries experience difficulty to satisfy the expectations of the institutions in terms of student throughput and research outputs. There are indeed many things to critically reflect on and parties that needs emancipation. The paper focusses specifically on information systems (IS) educations because of the skills-nature of the discipline and the complexity brought to lecturing by the ever changing technological applications guiding the study material in the field.

The paper starts with a motivation for the study in section 2. As critical systems thinking is used to understand the problems around e-learning research in information systems, a discussion of critical systems thinking is provided in section 3 focusing on critical systems heuristics. Section 4 provides background knowledge on critical social research methodology including action research. Section 6 explores how educational models can be used from a critical perspective as theoretical framework for e-learning projects. The paper concludes with reflections on how e-learning action research projects can be done from a critical social theory perspective to be beneficial to all the involved and affected parties.

## **MOTIVATION FOR STUDY**

In South Africa, most universities place high emphasis on research outputs from their academic staff members. Today, it is very hard to “only” be a lecturer; one has to find a way to publish your work in academic journals and conferences. This motivates lecturers to adopt teaching strategies suitable for publication rather than improving their students’ understanding of their study field. A fair amount of this kind of experimentation is done using action research as research methodology. A qualification in Education is not a prerequisite for a lecturer at South African universities. Quite often lecturers are not that interested in educational theory and do not have knowledge of proper educational theory. Furthermore many universities incorporate e-learning in their programmes hoping to free time of lecturers in order for them to increase their research output. Large amounts are spent on these systems and lecturers are encouraged to use it. Quite often these systems drive the instructional design and sound pedagogical principles are neglected. Govindasamy (2002) discusses the impact of not implementing pedagogical principles. He argues the advantages for both faculty members and students.

The author of this paper deals with this problem on a daily basis, first as examiner and reviewer of average dissertations and conference papers, and secondly, as supervisor of fellow lecturers who believe they can obtain post graduate degrees by simply telling their story. As programme manager for a fourth year IT programme, I also listen to many

## Critical Systems in Information Systems Education Research Methodology

students' stories about poor teaching. This paper aims to reflect on the problems of research in educational settings (also e-learning) from a critical systems thinking.

### CRITICAL SYSTEMS THINKING

A systems thinker views the world in terms of larger wholes or systems that have objectives and where the parts function together to achieve the overall objective of the system. Systems thinking developed over the years from hard systems thinking to soft systems thinking and later also critical systems thinking. Peter Checkland, one of the pioneers of systems thinking argues that a hard systems thinker sees systems in the real world while the soft systems thinker uses systems to make sense of a complex reality (Checkland, 1981).

A brief introduction to the ideas of critical systems thinking is given here. Authors such as Flood and Jackson (1991a), Ulrich (1983) and Midgley (2000) provides a detailed discussion. This discussion is organised according to the FMA model used by Checkland and Holwell (1998) to describe their action research development of soft systems methodology presented in Figure 1.

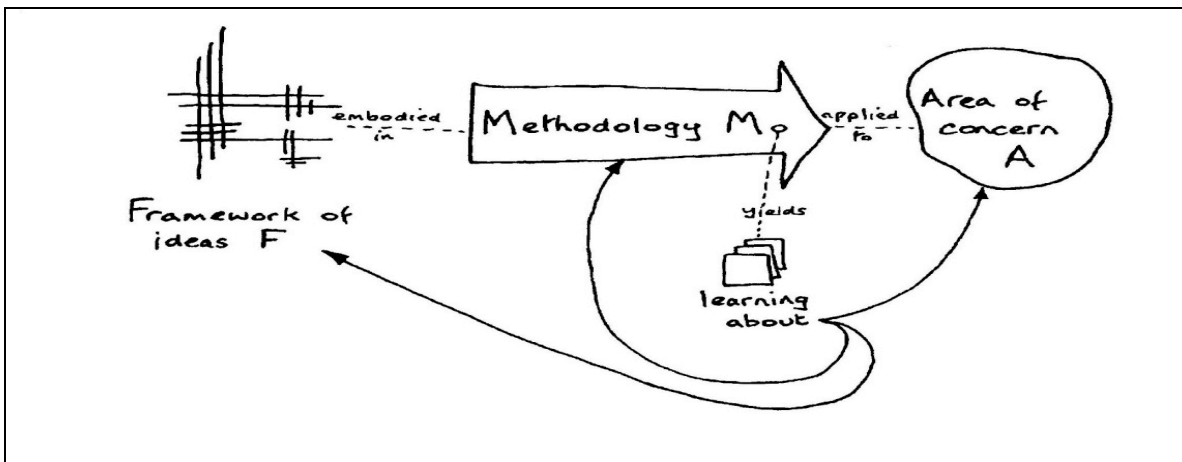


Figure 1 The FMA model of Chekland and Holwell (1998)

The F of the FMA model describes the framework of ideas that is embodied in a methodology (M) which in applied to an area of concern (A). Learning takes place about on all three these levels. In this discussion the three levels (F, M and A) are used to discuss different levels in critical systems thinking.

# **Critical Systems in Information Systems Education Research Methodology**

## **Critical systems thinking philosophy**

The framework of ideas (F) guiding critical systems thinkers is critical social theory. Critical social thinkers take the ontological position that the world is not fundamentally harmonious. Therefore, to understand, explain and make possible changes, one must think in terms of contradictions. Different perceptions can be seen as expressions of, and the means in, an irreconcilable conflict and power struggle between management and workers, or system developers and users (Dahlbom & Mathiassen, 1993).

## **Critical systems thinking methodology**

On a methodological (M) level in critical systems thinking one find guidelines for critical systems practices. Jackson (1991) discusses the five major commitments of critical systems thinking:

- Critical systems thinking seeks to demonstrate critical awareness. This critical awareness means that the assumptions and values of current and future designs should be critically examined. The strengths and weaknesses of the theoretical underpinnings of available systems methods, techniques and methodologies need to be examined.
- Critical systems thinking shows social awareness. This social awareness means that the organisational and societal pressures that lead to certain system theories and intervention methods used at particular times, should be recognised. System practitioners should also study the possible consequences of their actions more carefully than before.
- Critical systems thinking is dedicated to human emancipation. It seeks to achieve for all individuals the maximum development of their potential. This is accomplished by raising the quality of work and life in organisations and societies in which they operate (Jackson, 1991). Methodologies aim to improve the technical, practical and emancipatory interest in organisations and society.
- Critical systems thinking is committed to the complementary and informed development of all the different stands of systems thinking at the theoretical level. This means that different points of view of systems must be respected.
- Critical systems thinking is committed to the complementary and informed use of systems methodologies in practice. A methodology that respects the other four features of critical systems thinking is required.

## **Critical systems thinking practice**

On a practical application level (A) several methodologies have been developed. Midgley (2000) identifies two influential authors in the development of critical systems thinking as Jackson (1991) who promoted methodological pluralism and Ulrich (1983) who

## Critical Systems in Information Systems Education Research Methodology

developed critical social heuristics (CSH). Many more methodologies have gain acceptance such as systemic intervention (Midgley, 2000). This paper focus on the work of Ulrich (1983) as method to be used in action research in IS research in e-learning.

Ulrich (1983) developed a methodology for the practicing of critical systems thinking based on the concept of boundary judgement. He argues that both the involved and the affected of a situation should be involved in the “justification” of that situation. Ulrich (1987:104) accepts that “every chain of argumentation starts and ends with some judgements of which the rational justification must remain an open question.”

The critical heuristics of social design were designed by Ulrich (1983) as a means to deal critically with justification break-offs. It aims to reflect on the normative implications of systems design, problem designs, and evaluations of social programs. Ulrich’s (1987:105) critical heuristics consider three requirements to be essential to guide practitioners to practice practical reason: “

1. to provide applied scientists in general, and systems designers in particular, with a clear understanding of the meaning, the unavoidability and the critical significance of justification break-offs;
2. to give them a conceptual framework that would enable them systematically to identify effective break-offs of argumentation in concrete designs and to trace their normative content; and
3. to offer a practicable model of rational discourse on disputed validity claims of such justification break-offs, that is to say, a tool of cogent argumentation that would be available both to “ordinary” citizens and to “average” planners, scientists, or decision takers.”

Ulrich (1987) gives a critical view of Churchman’s (1968) boundary concept by not only asking “what is” but also asking “what ought to be” part of the system. All the affected parties should be regarded as part of the system. Boundary judgement is seen as a subjective process which needs to be transparent in order to identify all possible normative consequences of specific boundary judgments. In order to facilitate systematic identification and examination of justification break-offs (requirement 2 stated above), Ulrich (1987:108) has developed a checklist of twelve boundary questions: “

1. Who ought to be the client (beneficiary) of the system S to be designed or improved?
2. What ought to be the purpose of S; i.e. what goal stated ought S be able to achieve so as to serve the client?
3. What ought to be S’s measure of success (or improvement)?
4. Who ought to be the decision taker, that is, have the power to change S’s measure of improvement?
5. What components (resources and constraints) of S ought to be controlled by the decision taker?

## **Critical Systems in Information Systems Education Research Methodology**

6. What resources and conditions ought to be part of S's environment, i.e. should not be controlled by S's decision taker?
7. Who ought to be involved as designer of S?
8. What kind of expertise ought to flow into the design of S; i.e. who ought to be considered an expert and what should be his role?
9. Who ought to be the guarantor of S; i.e. where ought the designer seek the guarantee that his design will be implemented and will prove successful, judged be S's measure of success (or improvement)?
10. Who ought to belong to the witnesses representing the concerns of the citizens that will or might be affected by the design of S? That is to say, who among the affected ought to get involved?
11. To what degree and in what way ought the affected be given the chance of emancipation from the premises and promises of the involved?
12. Upon what world-views of either the involved or the affected ought S's design be based?"

These twelve questions can be divided into four groups of three questions each enquiring the sources of motivation, control, expertise, and legitimation respectively.

Contrasting "is" and "ought to" boundary judgements provides a systematic way to evaluate the normative content of planning as well as identifying the normative basis of the evaluation itself (Ulrich, 1987). Since experts and affected parties in a system have to justify their boundary judgements, the power of the expert is reduced. The affected party can argue on the same level as the expert on the consequences of specific boundary judgements.

In this paper CSH is used to guide diagnosis in action research in IS education research. The discussion thereof necessitates a discussion of critical social research methodology.

### **CRITICAL SOCIAL RESEARCH METHODOLOGY**

Hughes (1990:11) states "every research tool or procedure is inextricably embedded in commitments to particular versions of the world and to knowing that world." This implies that any method's effectiveness is ultimately dependent on epistemological justification. Different philosophers' epistemological views led to different stances or paradigms on research methodology. Positivism, interpretivism and critical social theory are identified by Klein and Myers (1999) as different research paradigms based on distinguishable epistemological and ontological views. This discussion provides a similar application of the FMA model (Figure 1) of Checkland and Holwell (1998) as the discussion of critical systems thinking.

# **Critical Systems in Information Systems Education Research Methodology**

## **Critical social research philosophy**

Critical social research is underpinned by a critical–dialectical perspective, which attempts to dig beneath the surface of historically specific, oppressive, social structures (Harvey, 1990:1). Critical social theorists see knowledge as being structured by existing sets of social relations that are oppressive. This can be class, gender, or race oppression. “Knowledge is critique... It is a dynamic process not a static entity... It is the process of moving towards the understanding of the world and of the knowledge which structures our perceptions of the world” (Harvey, 1990:3)

Habermas’ ideas are generally accepted as underpinning to current critical social research methodologies. Flood and Jackson (1991a:131) quotes Habermas (1974:32) on the relationship between theory and practice: “The mediation of theory and praxis can only be classified if to begin we distinguish three functions, which are measured in terms of different criteria; the formation and extension of critical theorems, which can stand up to scientific discourse; the organisation of processes of enlightenment, in which such theorems are applied and can be tested in a unique manner by initiation of processes of reflection carried on within certain groups towards which these processes have been directed; and the selection of appropriate strategies, the solution of tactical questions, and the conduct of political struggle.”

## **Critical social research methodology**

Harvey (1990) provides guidelines for critical social research which focus on the deconstruction of problem situations in terms of oppressing structures followed by the reconstruction in order to emancipate the participants. His principles for critical social research are summarised as follows:

1. Through abstraction, critical social research aims to reveal underlying structures that are otherwise taken for granted. These structures specify the nature of the abstract concepts which have themselves been assimilated uncritically onto the prevailing conceptualisation.
2. Totality refers to the view that social phenomena are interrelated to form a total whole. Social phenomena should not be investigated in isolation but always as part of a larger context.
3. Essence refers to the fundamental element of the analytical process. Critical social researchers view essence as a fundamental concept that can be used as the key to unlocking the deconstructive process.
4. According to Harvey (1990), praxis means practical reflective activity. It is activity that changes the world. The critical social researcher is not only interested in understanding the world; he/she aims to change the world. It is not the actions of an individual that is of interest but rather the actions that change the social formations.

## **Critical Systems in Information Systems Education Research Methodology**

5. The historical contexts of the different organisations used in the case studies need to be investigated. Previous attempts to change current practices and the reasons for such changes need to be explored.
6. The critical researcher aims to deconstruct the situation into abstract concepts in order to study the interrelations between the concepts with the purpose of discovering the key to the structure of the situation. The core concept is used to reconstruct the situation. This is an on-going process to expose the ideology underpinning the situation in order to identify the oppressive mechanism, which requires change.

More recently the award winning authors of the principles for interpretive research in Information Systems, Myers and Klein (2011) publish principles for critical social research in Information Systems. Their principles echo the ideas presented by Harvey (1990):

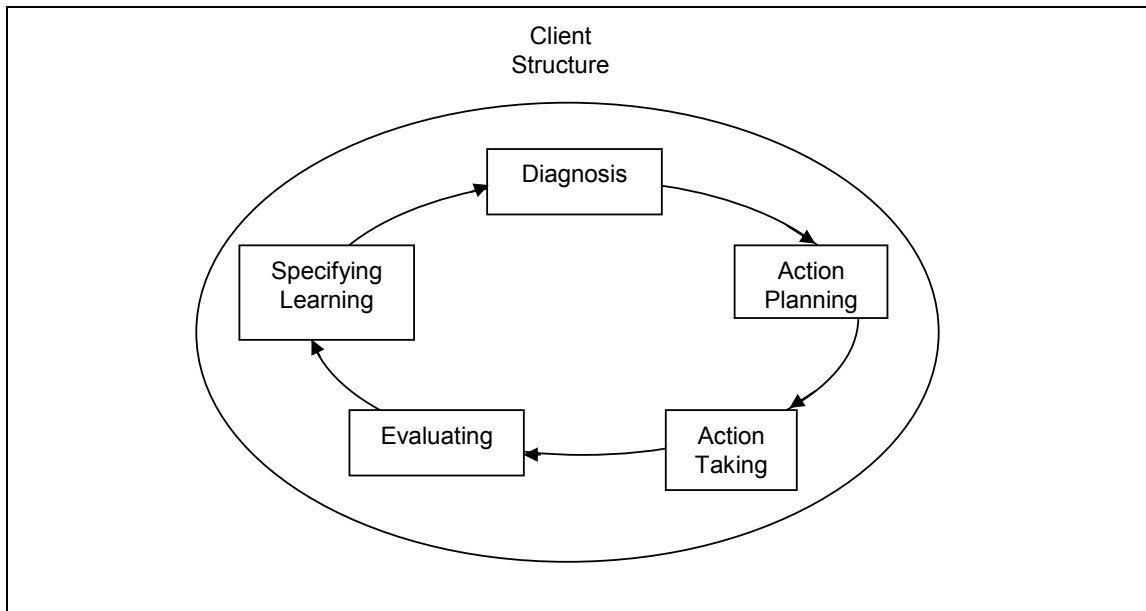
1. The principle of using core concepts from critical social theorists
2. The principle of taking a value position
3. The principle of revealing and challenging prevailing beliefs and social practices
4. The principle of improvements in society
5. The principle of individual emancipation
6. The principle of improvements in social theories

### **Critical social research practice: Action research**

Action research is often used as research method for critical social research. Action research is a participative and iterative method used to solve problems. Baskerville (1999) identified five stages in the cyclic IS action research process: (1) diagnosing, (2) action planning, (3) action taking, (4) evaluating, and (5) specifying learning, as depicted in Figure 2. A brief discussion of these follows from a critical social research perspective.



## Critical Systems in Information Systems Education Research Methodology



**Figure 2 The action research cycle (Baskerville (1999))**

### *Diagnosis*

In the diagnosis phase of action research the goal is to understand the problem environment. From a critical social theory perspective the diagnosis phase aimed at deconstruction of the problem situation to identify the oppressive structures in order to reconstruct the situation while relieving the oppression. From a critical systems perspective the focus would be to understand the problem from the different perspectives of the involved and the affected.

Since the focus is on understanding the ideas from the interpretive research paradigm can be used. Klein and Myers (1999) provide guidelines for interpretive research in information systems. Hermeneutics is the foundation of these guidelines. Hermeneutics as described by Klein and Myers (1999) is the process of achieving understanding of the whole by understanding the parts in terms of their role in the whole. This cycle of switching between the whole and the parts is known as the hermeneutic cycle.

### *Action planning*

Action planning is a collaborative effort to specify actions to relief or to improve the specified problems. The plan should also include a description of the target state or desired future state of the organisation. As advised by the first principles of Myers and Klein (2011) the work of critical social theorists should guide the planning of the intervention.

## **Critical Systems in Information Systems Education Research Methodology**

### *Action taking*

Action taking refers to the collaborative effort of intervention in the organisation. Changes can be made directly or indirectly. Lewin's (1948) model of unfreezing, changing and freezing can be followed. From a critical social perspective action taking represents the process of eliminating oppressive structures and reconstructing the problem situation without the identified oppressive structures.

### *Evaluation*

A collaborative evaluation of the resulted state of the organisation is done to determine if the changes had the desired effect. This implies that the current state is compared with the desired future state described during action planning. Where the action was successful, the evaluation should determine whether the success could be attributed solely to the planned action. Where the action was unsuccessful, the reasons should be analysed, and the action plan for the next iteration needs to be designed.

### *Specifying learning*

The research team needs to specify and document the learning that took place during the specific iteration of the action research cycle. The organisational norms should be changed to reflect the new knowledge gained. Where the change was unsuccessful, the additional knowledge should be added to the original research design, altering the research plan as required. Where the change was positive, the specific situation and the successful action need to be carefully documented to aid future research, not only in the specific situation, but also in similar situations.

### **Action research according to the FMA model**

Checkland and Holwell (1998) developed the FMA model depicted in Figure 1 in the second section of this paper to represent their action research process to develop soft systems methodology (SSM). In their model, the area of application (A) is the real-world problem situation where they applied SSM to improvement. The methodology (M) is in their case SSM that they kept on developing from the results of various applications of it. The framework of ideas (F) are the theoretical underpinnings of SSM, in their case the soft systems ideas of different perspectives according to different world views. Specifying of learning should be done in terms of F, M and A.

## **LEARNING AND TEACHING STRATEGIES APPLICABLE TO E-LEARNING IN INFORMATION SYSTEMS EDUCATION**

In order not to clutter the main argument of the paper presented in the section hereafter, a brief review of learning and teaching strategies that might be applicable to e-learning in information systems education is provided here. It is clear from the discussion thus far that existing theory should guide intervention in action research projects. This section provides a brief description on two educational approaches that might be useful in e-

## **Critical Systems in Information Systems Education Research Methodology**

learning in information systems, namely self-directed learning, and learning styles. Before these are described brief comments are made about e-learning in information systems.

### **E-learning in Information Systems**

As indicated in the motivation of the study, many universities are adopting e-learning strategies to reach larger groups of students. One needs to distinguish between two types of e-learning applications, pure e-learning and blended e-learning.

In pure e-learning all teaching activity is done by means of electronic communication. There are no face-to-face contact between lecturer and student. Students receive all tuition in electronic format including videos, notes, slides and others. Blended e-learning refers to a combination of face-to-face teaching and e-learning material. Contact sessions and e-learning material are combined to enhance learning by the students.

The skills nature of IS content makes a pure e-learning approach very difficult. Most modules in IS such as systems analysis and design, computer programming and database management require students to develop a specific skill. Lecturers prefer blended learning where they use the contact time more efficient to facilitate skills development.

### **Self-directed learning**

This paper presents self-directed learning as a framework of ideas for e-learning research. Self-directed learning (SDL) is a concept introduced by Malcolm Knowles in 1975 . Key to this concept is moving the responsibility of learning away from the teacher to the learner. The learner should take control of the learning experience and the teacher should only facilitate this process. In teacher oriented learning the learner is externally motivated in terms of rewards and punishment, whereas in SDL the learner is internally motivated, by aspects such as accomplishment or curiosity to learn Knowles (1975).

However, self-directedness in a learner develops in stages. Grow (1991) describes different phases of self-directed learning skills of learners as dependent, interested, involved and self-directed. Learners need to be guided to become more self-directed over time. Individual students have different levels of SDL skills and one should provide guidance to different students according to their SDL skill. This aspect is also referred to as SDL-readiness. Guglielmino (1977) provides an SDL readiness test, which is developed from a positivistic research paradigm consisting of Likert-scale type questions. Students' responses to questions are analyzed and a score is computed indicating the readiness of a specific student for SDL. Problem-based and project-based learning are teaching strategies that applies the ideas of SDL in a specified manner. In project-based learning students are given an industry type problem to complete. They are responsible for planning their own learning activity. Helle *et al.* (2006) give a good discussion of project-based learning.

## Critical Systems in Information Systems Education Research Methodology

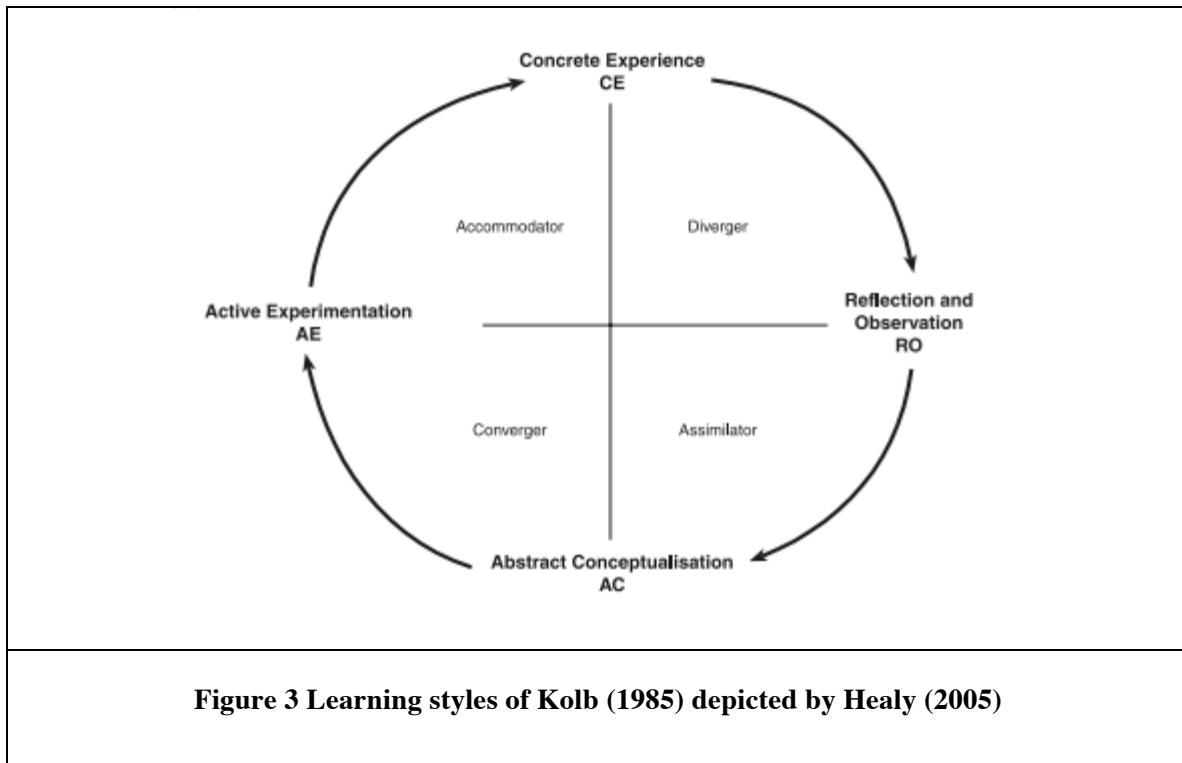
### *Using SDL in e-learning in IS from a critical perspective*

The level of prior knowledge of module content often varies amongst students in a module. Some students may have previous experience in the field while others lack basic knowledge. Students lacking basic knowledge might be able to improve their own frame of reference by specific assignments, however as indicated by the work of Grow (1991), one cannot make the assumption that all students can work on their own. When using SDL one should involve the students in true critical systems thinking and critical social theory tradition. Their readiness for SDL should be understood before one embarks on creating SDL based e-learning material. The SDL motivated e-learning material should be designed explicitly to suit different levels of SDL readiness and it should be explicitly indicated how the student is guided to grow in SDL skills.

### **Learning styles**

Another educational approach that may guide e-learning in information systems is that of learning styles. The supporting idea is that not all learners use the same cognitive strategies to learn, some use a more visual method while others are more inclined to learn from verbal information. The work of Kolb (1976) can be seen as pioneering this field in education. Kolb (1985) views learning as a cycle consisting of four phases on two dimensions as indicated on Figure 3. The learning cycle starts with concrete experience leading to reflective observation. The reflective observation leads to abstract conceptualisation of experiences, which in turn enables active experimentation. These phases form two dimensions, a horizontal dimension with active experimentation and reflective observation as extremes and a vertical dimension with concrete experience and abstract conceptualisation as extremes. As indicated on Figure 2 the four quadrants are formed by these 2 dimensions. Kolb (1985) associates a learning style with each of the dimensions. Kolb describes a diverger as a learner that is able to view a concrete from different perspectives. Assimilators are to integrate and make sense of different sources of information. The ability to apply theories to practical problems is characteristic of convergers, while accommodators learn from practical experience.

Various studies have been done to investigate the applicability of these styles in education. One such study by Healy *et al.* (2005) analysed the learning styles of students in geography from the USA, UK, Australia, and New Zealand. They provide information on how knowledge on learning styles could be used to improve the learning outcomes of undergraduate students. Felder and Silverman (1988) also developed a model for learning styles of students. Their work also includes an evaluation of preferred learning styles that can be used to analyse the learning styles of individual students.



### *Using Learning styles in e-learning in IS from a critical perspective*

From a critical systems perspective one might argue that the fundamental idea that different students learn according to different learning styles, is one that complements the pluralistic foundation of critical systems thinking. In practice in e-learning one can design different version of course material accommodative of specific learning styles. This is easier implemented in an e-learning environment since the same content may be presented differently and students are able to select material appropriate for their learning styles.

### **USING ACTION RESEARCH AS RESEARCH METHODOLOGY IN I.S. EDUCATION FROM A CRITICAL SYSTEMS PERSPECTIVE**

This section forms the main part of the paper it shows how action research can be used as research methodology in research in e-learning in information systems classes from a critical systems perspective.

Although action research is often used as research methodology in IS education, it is very seldom done from an explicit critical social stance. The first argument of this paper is that the critical social nature of action research should be made explicit in IS education research. The aim of the research process should be explicitly formulated in terms of emancipation of the oppressed.

## Critical Systems in Information Systems Education Research Methodology

This section aims to provide guidance on how this can be achieved. It is organised according to the phases of action research and concludes with reflection of the FMA model.

### Diagnosis phase

The aim of the diagnosis phase should be to deconstruct the problem situation, enabling the identification of the oppressing structures in order to guide reconstruction in the subsequent phases leading to the emancipation of the oppressed. Deconstruction can only be successful if all the affected parties are represented in the process. Harvey's focus on history and essence gives guidelines in this respect. As indicated earlier rigorous interpretive data collection (interviews) and analysis can be used. The true critical thinker will be very explicit in participant selection to ensure that all perspectives are represented. Ulrich's CSH can be used to aid the formulation of different perspectives. Ulrich (1981:308) prioritizes problems exploration when he writes: "A truly rational and truly democratic planning process must therefore start with a practical discourse among the involved and affected where the "problem" itself is the problem." Table 1 provide an example of the how the answers of the 12 boundary questions of CSH may be used to express different perceptions of lecturing in general.

**Table 1 Reflection on lecturing in terms of CSH**

<i>Question</i>	<i>Perception of the author of this paper of "what should be"</i>
<i>1. Who is / ought to be the client (beneficiary) of the system S to be designed or improved?</i>	In the university environment, the student and industry should benefit from the activity of the lecturer. From a research perspective, the wider student community should benefit from research in educational matters. The lecturer should benefit as research professional from research. The university should benefit as a result of better quality tuition and more research output.
<i>2. What is / ought to be the purpose of S; i.e. what goal stated ought S be able to achieve so as to serve the client?</i>	The purpose of lecturing a specific module should be to achieve learning by the students in order to reach the knowledge and skills of the qualification programme. However lecturing can be done in such a way as to share the benefits of specific strategies to the wider community of scholars in the field.
<i>3. What is / ought to be S's measure of success (or</i>	Students should have an improved success rate in the module and if possible innovative teaching should be shared by means of articles or dissertations with the

## Critical Systems in Information Systems Education Research Methodology

- improvement*)? wider community of scholars in the field.
4. *Who is / ought to be the decision taker, that is, have the power to change S's measure of improvement?* The lecturer of the module.
5. *What components (resources and constraints) of S are / ought to be controlled by the decision taker?* The lecturer should be the primary decision taker on the teaching strategy and the suitability thereof for the module in the first place and secondly the applicability of the teaching strategy for publication.
6. *What resources and conditions are / ought to be part of S's environment, i.e. should not be controlled by S's decision taker?* The teaching strategy adopted by the university – for example, distance learning. Another aspect is the requirements for publications by academic staff members of the university.
7. *Who is / ought to be involved as designer of S?* The lecturer, member of academic support services and an expert in research methodology.
8. *What kind of expertise is / ought to flow into the design of S; i.e. who ought to be considered an expert and what should be his role?* The lecturer and experts from academic support services should ensure that the teaching strategy will have the required effect from a student development perspective. From a research perspective an expert should guide the lecturer to choose a viable research strategy,
9. *Who is / ought to be the guarantor of S; i.e. where ought the designer to seek the guarantee that his design will be implemented and will prove successful, judged be S's measure of success (or improvement)?* The head of the department or dean of the faculty should ensure that the required learning of the students was sufficiently supervised by the lecturer. The research manager should ensure that any forthcoming publications are of a high academic standard.
10. *Who is / ought to belong to the witnesses representing the concerns of the citizens that will or might be affected by the* The students and the industry are affected by the teaching strategy and normally not directly involved in curriculum and module planning. The institution should appoint a witness to verify that the concerns of

## Critical Systems in Information Systems Education Research Methodology

*design of S? That is to say, who among the affected ought to get involved?* the students are taken into account.

11. *To what degree and in what way is / ought the affected be given the chance of emancipation from the premises and promises of the involved?* Representatives of students and the industry should be part of the change of module content process – the diagnosis phase of action research is of special value here.

12. *Upon what world-views of either the involved or the affected is / ought S's design be based?"* It is possible to design a module in such a way to achieve the required learning by the students and to be able to use innovative methods in a changing learning environment and to publish these methods or strategies to the benefit of the wider academic community.

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The outcome of the diagnosis phase should be a clear description of the problem situation representative of different involved and affected parties. The essence of the environment should be clear. Furthermore it should identify the oppressing structures responsible for the oppression.

### Action planning phase

Action research differs from consultation in that it uses theory to guide intervention. After diagnosis educational theory should be critically examined to find one or more theories that may be used to plan the reconstruction of the problem environment. Technology should never drive teaching practices, it should serve teaching practices.

Self-directed learning in the form of project-based learning can often be used to achieve better preparation of IS students for the expectations of industry. In situations where diverse levels of skills of students are problematic self-directed learning may be used to provide a stimulating learning environment to all.

E-learning environments especially when used in blended learning create an opportunity to individualise learning content to provide for different types of learners. When the theoretical concepts of self-directed learning are combined with the theory of learning styles, students can achieve self-managed learning with high success rates. In IS this is especially important as students must become life-long learners in an ever changing technological work environment.

The result of the action planning phase should be a clear plan which explicitly addresses fears and expectations of all the involved and affected parties as identified during the



## **Critical Systems in Information Systems Education Research Methodology**

diagnosis phase. The action should be linked to educational theory as this process also provides some degree of guarantee of the success of the plan as promoted by CSH.

### **Action taking phase**

Action taking constitutes the reconstruction of the problem situation without oppressing structures. Action taking can only be successful if it is participative in nature. Care should be taken to be aware of unintended consequences of the proposed action. It is very difficult to allow for all consequences during the planning phase, therefore one should constantly reflect while implementing a plan to identify all consequences.

As a lecturer, one is aware that not all students are always motivated by the acquiring of knowledge. Sometimes students would do anything to achieve a certain grade for a module without prioritizing mastering of the intended skills. Innovative techniques might be required to protect the integrity of the qualification against misuse. The students who do not want to study and just want to obtain the credit for the module should be identified as an interested party be the designers of the e-learning system.

Another comment on action taking in e-learning needs when action research is done from a critical systems perspective: It is common to use test and control groups in research. This is very problematic in an action research project where a proper diagnosis was made from a critical systems perspective. The researcher should be convinced of the success of the intervention prior to action taking and it is extremely problematic to allow only some participants the advantage of the intervention. Some researchers argue that they benefit all participants eventually and that applying the intervention to small groups at a time is beneficial. In the limited time allowed for academic semesters this argument is difficult to sustain.

### **Evaluation of success phase**

The purpose of the evaluation of phase is to determine whether the intervention was successful. From a critical systems perspective the evaluation phase focusses on oppressed and the required intervention to emancipate the oppressed. A common problem in this phase is to illustrate the relationship between the intervention and the outcome. Can we prove for example that the additional video material on difficult parts of the subject content was responsible for the higher pass rate?

Often usage of e-learning material is measured in terms of web clicks. A log is created of all mouse activities by a user of e-learning material. This is seldom sufficient evidence of the relationship between the availability of the e-learning material and improvement of module marks. One cannot prove that the student watched the video when his browser was playing the video, perhaps he sat in front of his computer and read his text book while the “boring” video was finishing. From a critical perspective one might be satisfied with such a situation, but from a research rigor perspective web click log are fraught with problems.

## **Critical Systems in Information Systems Education Research Methodology**

When one is explicit about the critical social theory orientation of action research, it is easier to evaluate success. The key question to be answered is: To which degree did the intervention lead to the emancipation of the oppressed? It is advisable to use the same interpretive methods used in the diagnosis phase to understand different perceptions of the involved and affected in terms of emancipation.

One of the affected parties is the university management responsible to raise through-put numbers. From their perspective the intervention will only be successful if a higher sustainable pass rate was achieved. From the perspective of industry, pass rate might not be so important: they want to know whether the students obtained a level of skill that can benefit industry. One should link the evaluation of success directly to the diagnosis phase.

### **Specifying learning phase**

As indicated before the FMA model of Checkland and Holwell (XX) given in Figure 1 provides guidance in this regard. In a successful action research project, the students and the lecture are emancipated from oppressing structures in the learning environment. This improvement or emancipation is in the area of application (A).

Often intervention (action) is guided by a pluralist approach of combining different methods. In this paper CSH, SDL and learning styles are named as methods to guide phases in the cycle. Learning about these methods or methodologies corresponds to the methodology (M) level of the FMA model.

In terms of the framework for understanding (F) learning takes place on the framework of thinking embedded in the methodologies. In terms of CSH the framework of understanding is also critical social theory or even the application of the ideas of Kant such as polemical reasoning. In terms of educational theory, learning takes place about educational philosophy such as constructivism.

After the contribution of the cycle was identified a new cycle starts with another diagnosis process. This cyclic process continues until the desired emancipation was achieved.

## **CONCLUSION**

This paper promotes the use of action research from an explicit critical systems perspective. It show how the two models of action research of Baskerville (1999) and Checkland and Holwell (1998) need to be used in combination to achieve good scholarly results as well as emancipation.

The paper focusses on IS research in e-learning as the nature of IS makes action research possible and the ever changing nature of IS and IS education requires a different strategy to more traditional teaching.

## Critical Systems in Information Systems Education Research Methodology

A research project using constructivism and SDL principles (F) for the design and implementation of a blended or e-learning environment (M) to solve student problems in a specific module (A) is a good example where the FMA framework of Checkland and Holwell (1998) is used to achieve good teaching that leads to good research.

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