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Publishing Information Systems Action Research for a Positivist Audience

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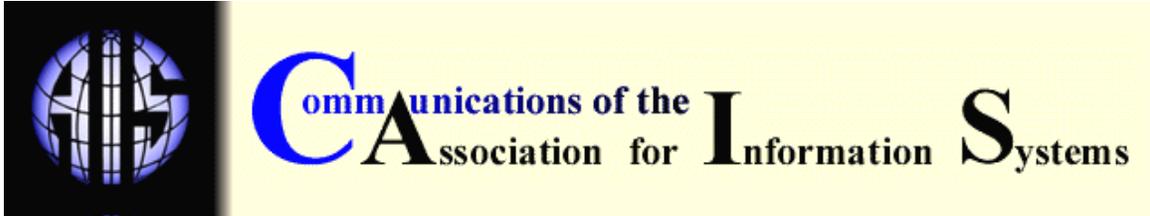
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PUBLISHING INFORMATION SYSTEMS ACTION RESEARCH FOR A POSITIVIST AUDIENCE

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ABSTRACT

Action research is particularly valuable for its ability to inform theory while making a practical difference. Special issues of *MISQ* in 2004 and *Information Technology and People* in 2001 called attention both to action research and research methodology. Yet action research is not widely disseminated across the information systems discipline.

The purpose of this tutorial is to advance information systems action research and serve researchers, practitioners, and reviewers by addressing the dissemination problem. We consider how an action research project and the resulting article can widen its appeal to information systems scholars in two ways. First, by clarifying the information systems research paradigm vocabulary of epistemology, methodology, and the action research approach. And second, we outline an article structure more familiar to positivist researchers, thereby creating a bridge among IS scholars to a largely positivist audience. This tutorial is based on the experiences of the authors as information systems action researchers.

Editor's Note: This tutorial was developed based on a presentation made at AMCIS 2005.

Keywords: positivist, post-positivist, interpretive, action research, paradigm, multi-methods

I. OVERVIEW OF THIS TUTORIAL

Action research (AR) is particularly valuable for its ability to inform theory while making a practical difference. Special issues of *MISQ* in 2004 and *Information Technology and People* in 2001 called attention both to action research and "intensive" [Markus and Lee 1999] research methodology. Yet action research is not widely disseminated across the information systems discipline.

One possible reason for its limited use is that the AR approach still suffers from a lack of consistent language and lack of guidelines for the conduct and for the presentation of AR [Avison et al., 1999]. This tutorial addresses both of those concerns. It provides suggestions to improve the consistency, readability, and thus dissemination of AR.

Why take a positivist-like approach to AR? Part of the answer is that it fits a paradigm we believe in. Part of the answer is political – that, among the many types of readers, researchers, reviewers, and funding sources, positivists are in the majority. Formatting research articles in a manner that is more readily digestible for a larger audience creates a bridge to that audience, which can only help valuable AR become more understood, accepted, and disseminated.

This tutorial serves researchers, practitioners, and reviewers. It: 1) shows action researchers how they may use consistent vocabulary and a positivist perspective and increase the range of publishing venues; 2) shows positivist researchers how they may publish relevant action research; and 3) shows practitioners and reviewers the types of variations in action research and IS research paradigm vocabulary and variations in article structure that exist in the field so that they may better understand and frame AR. This tutorial is based on the experiences of the authors as information systems action researchers.

In each of the following sections, we elaborate on the content we believe would be in the corresponding section of a journal article with a positivist viewpoint, but with applicability to other epistemologies. In the Introduction Section (II), the “who cares?” questions are discussed. It provides definitions, type of research, and the general problem area. The next section (III) discusses Theory, which includes post-positivist approach to hypotheses. Section IV, The Methods Section, emphasizes criteria and multi-methods. The Results Section (Section V) includes organizational and presentational suggestions for planned and emergent constructs and supporting and questioning evidence. Section VI (The Discussion Section) includes the use of triangulation of evidence to support or question a theory, presentation suggestions, and generalizability. Lastly, the Conclusion Section (VII) provides a concise summary of suggested journal article content by section, an organization that is designed to improve acceptance by a broad audience.

II. THE INTRODUCTION SECTION

ACTION RESEARCH VOCABULARY

The form of action research to which this tutorial applies is canonical action research (sometimes referred to as classic AR). Hult and Lennung [1980] provide a complete definition of canonical action research:

Action research simultaneously assists in practical problem-solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable ethical framework.

Recent special issues for action research have brought this emerging investigative approach to the forefront of awareness, demonstrating that AR can be comparable in impact to more established research approaches like experiments and case studies.

The cyclical, iterative process used in canonical action research is one feature that helps distinguish it from other types of action research. Canonical AR, is iterative, rigorous, and collaborative [Baskerville and Wood-Harper 1998]. It iterates the five collaborative (practitioner/researcher) steps for each research cycle [Davison et al. 2004; Susman and Evered 1978] as summarized in Figure 1: diagnosing the problem; planning the action; taking the action; evaluating the results; specifying lessons learned. Of these five steps, the last, specifying learning, is considered the most important [Lau 1997] as that learning is passed on to the next cycle.

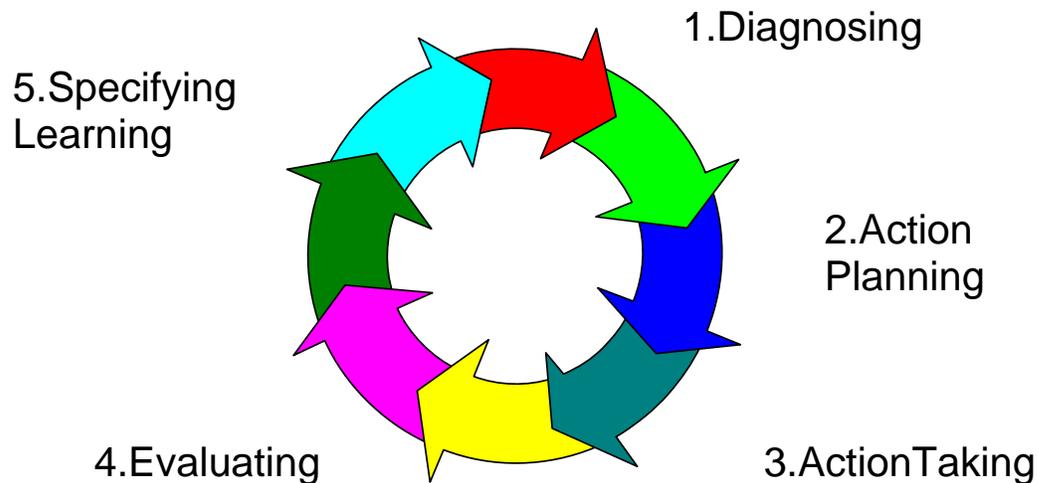


Figure 1. The AR Cycle

Canonical AR focuses on both organizational development and the generation of knowledge [Davison et al. 2004; Baskerville and Wood-Harper 1998]. The other characteristics of canonical AR are the collaboration between research and practice and the dual goals of organizational development and contributing to scientific knowledge. Canonical action research is particularly valuable to both researchers and practitioners for its ability to inform theory while making a practical difference [Baskerville and Myers 2004]. Baskerville and Wood-Harper [1998] provide characteristics of a variety of forms of AR. We have adapted this information to demonstrate the broad range of action research paradigms in published articles and summarized it in Table 1.

As a research approach, AR is relatively early in its development. Many credit Lewin [1946] for developing AR to study social psychology in the field and facilitate social change/theory after World War II. The Tavistock Institute used a similar approach with psychological and sociological disorders [e.g., Lewin 1948]. An early definition was published by Rapoport [1970] along with a discussion of the dilemmas of conducting research while playing dual roles – serving both the researcher and the client. Susman and Evered [1978] espouse the merits of (canonical) AR and are credited with establishing the five-step research cycle shown in Figure 1. Lee [1989], Lau [1997], and Eden and Huxham [1996] provide AR guidance, followed by Davison et al. [2004] with principles specific to Canonical AR.

More than five years ago, senior researchers criticized the shortage of theoretical IS research relevant to practitioners [Benbasat and Zmud 1999; Davenport and Markus 1999; Paper 2001; Robey and Markus 1998] echoed by the Academy of Management's call for interdisciplinary research that integrates theory and practice [Tranfield and Starkey 1998]. The situation is not much better now.

One might conclude that AR satisfies many needs by contributing both to theoretical and practical contexts. Baskerville and Wood-Harper [1996, p. 235] strongly advocate that AR be used in IS research as “an exemplar of a post-positivist social scientific research method, ideally suited to the study of technology in its human context.”

Table 1. Forms of Action Research

AR TYPE	BRIEF DESCRIPTION	EPISTEMO-LOGICAL ORIENTATION (STRENGTH)	REFERENCE
Positivist AR	The research is clearly based on predefined hypotheses, which are aimed at testing a theory using multiple methods in a particular context.	Positivist (high)	DeLuca and Valacich [2006]
Action science	The goal of the research is to solve problems in a client organization by exposing differences between “espoused theories” and “theories in use.”	Positivist (medium)	Argyris and Schon [1991]
Canonical AR	Theory provides the general basis on which action planning takes place. Attention is paid to theory assessment and refinement.	Positivist (low)	Davison et al. [2004]
Participatory AR	Theory emerges through the research. Research client participates actively in the data analysis and respective learning process.	Interpretive (high)	Greenwood et al. [1993]
Multiview	The goal is to identify and improve a client situation through the use of a joint information systems development methodology.	Interpretive (medium)	Bell and Wood-Harper [2003]
Soft systems methodology	The goal is to diagnose and solve a problem in a client organization through a well defined and structured process-oriented methodology.	Interpretive (low)	Checkland and Scholes [1990]
Critical AR	Research is motivated by power imbalances and is aimed at having a liberating effect, whereby power imbalances are reduced or eliminated.	Critical (high)	DePoy et al. [1999]

One reason AR is considered exemplar research is the dual intention of AR spelled out by Eden and Huxham [1996] with their recommendations for improving practice and contributing to theory and knowledge within and beyond the project. McKay and Marshall [2001] make clear that canonical action researchers serve both researchers and practitioners at every step in the cycle. Baskerville and Myers [2004] address theory and practice in their four pragmatist premises for AR:

1. establish purpose of action (explicit theoretical basis);
2. practical action in the problem setting;
3. practical action must inform theory;

4. reasoning and action are socially situated (researchers are participant observers, part of a collaborative team throughout process).

If AR is so useful, why is it not more prevalent? Part of the problem is that this type of “intensive” research [Markus and Lee 1999] generates large amounts of information organized by ever-growing numbers of cyclical sections – extra work for the reader. We believe that, in order to improve the readability and, thus, publishability of action research studies, three key problem areas must be addressed:

1. inconsistent action research vocabulary;
2. inconsistent information systems research paradigm vocabulary; and
3. inconsistent structure of articles that report on action research projects.

The first of the three problem areas to be improved, regarding action research vocabulary, was covered above. Suggestions for IS research paradigm vocabulary and the structure of action research articles follow.

IS RESEARCH PARADIGM VOCABULARY

Even though this tutorial advocates the AR approach, we want to be clear that we respect the variety of types of research and are attempting to be informational about them so that researchers can make clearer choices and clearer explanations about the research they select for their work. Lincoln and Guba [2000] discuss research paradigm in terms of axiology, ontology, epistemology¹, and methodology. We adapt and extend this model to include research approach, which indicates the type of interaction the researcher has with the participants. A more complete typology of a research paradigm is shown in Table 2.

Table 2. Typology of an IS Research Paradigm

Component	Definition	Examples
Axiology	Ethical, aesthetic, and spiritual considerations	Excluding information, deception, participant health, natural environment
Ontology	Nature of reality/ people	Real, constructed
Epistemology	Relationship between inquirer and the known	Positivist, interpretive, critical, postpositivist, constructivism, participatory
Methodology	Means for gaining knowledge	Quantitative, qualitative
Research Approach	Type of involvement with participants	AR, Case Study, Ethnography, Experiment

¹ Axiology is the study of values and value judgments. Ontology as used in information systems refers to explicit formal specification of how to represent the objects, concepts and other entities in some area of interest and the relationships among them. Epistemology is a branch of philosophy that studies the assumption, foundations, and nature of knowledge as well as its extent and validity.

In the past, AR was variously referred to as:

- epistemology
- methodology
- research approach

This confusion does not help others to understand AR studies. Lack of understanding of the research paradigm has created a political scenario that may:

1. obstruct dissemination of knowledge gained either to research or practice;
2. affect the ability to publish; and,
3. for junior faculty, it may also affect tenure.

In this tutorial, we are concerned specifically with how to make AR articles easier to understand and hence more likely to be published.

Relative to IS research paradigm vocabulary, we contend that:

- the paradigm concept can be better used;
- AR is not an epistemology or methodology but a research approach that may be performed from various epistemological stances [Klein and Myers 1999; Kock and Lau 2001] using various methods.

Although AR is typically viewed from an interpretive² perspective, AR can be conducted with positivist, interpretive, and critical epistemologies. The frequent (mis)categorization of AR as a methodology partly stems from the rather unique use of five-step cycles for interaction with participants and reporting. The five-step cycle is used in canonical AR³. Because positivists often expect that the term *methodology* refers to numerical statistical analysis, we argue that the term methodology should include rigorous quantitative and qualitative data analysis techniques and that the term AR be reserved for use as a *research approach*.

Orlikowski and Baroudi [1991] distinguish positivist epistemology as containing a priori relationships, testing theory/hypotheses, quantifiable measures, and generalizing from the sample to the population. They characterize interpretive research by lack of imposition of a priori understanding, creating a subjective meaning based on interaction with the environment, and not generalizing. The disparate characterizations and interpretive emphasis on uniqueness may be partly responsible for a history of interpretive research reporting virtually each situation in a unique format. The philosophical basis for most research is not AR⁴ but the empirical tradition of positivism as described by Orlikowski and Baroudi and applied as in the natural sciences [Baskerville and Wood-Harper 1996]. They contend that those schooled only in this tradition or the arch-positivist (and experimental) viewpoint may dismiss the participatory nature of AR as unscientific. But to the post-positivist, the AR approach can be empirical, interpretive, experimental, multivariate, observational, interventionist, and participants influence of outcomes. As positivism is the prevalent view, other types of research are less accepted. Because we aim to disseminate valuable AR, we emphasize the need to be specific about our paradigm in the Introduction section of our articles so that readers are not confused.

² Klein and Myers [1999] give practical examples of all three epistemologies.

³ But not necessarily all AR (e.g. dialogical AR as discussed by Martensson and Lee [2004]) See Table 1 for a summary of alternative forms of AR.

⁴ AR is not an epistemology.

Being clear is not all that simple. The older model of interpretive research was improved to include more theory [Klein and Myers 1999] and generalizability [Lee and Baskerville 2003]. Paradigms are beginning to interbreed to the extent that none is a single truth [Lincoln and Guba 2000]. Although the early description of epistemologies appears to make them incommensurable, others are integrating the benefits of positivist and interpretive epistemologies [Lee 1991; Mingers, 2001], claiming there is little difference [Weber 2004] or finding the overarching logic [Lee, 2005]. Weick [1999] calls paradigms a “heavy tool” that theorists need to drop in favor of reflexive listening. Czarniawska [1998], in an article titled “Who Is Afraid of Incommensurability?” argues that understanding one another is the point. In all this confusion, we need to be aware of different paradigm traditions so that we (1) make a choice about them and (2) are specific about the characteristics of our research for the benefit of our audience. We assert that in the introduction section of their articles, IS researchers, including AR researchers, should specify their:

- Axiology;
- ontology;
- epistemology;
- methodology; and
- research approach, and in the case of AR, the form of AR [Lau 1997].

A paragraph that includes an overview of the axiology, ontology, epistemology, methodology, and research approach used by the authors would give all readers a frame of reference for the rest of the article. We believe social phenomena can either be unique to the situation or apply to other situations and are best observed in their natural environments. We believe it is difficult to do research on social phenomena without changing the phenomena by studying it. Therefore, AR researchers study interactively and report interactions. This tutorial addresses canonical action research performed using a (post)positivist epistemology, with both qualitative and quantitative methodology. Post-positivist is a term used by Lincoln and Guba [2000] to indicate, among other things, use of a different type of hypothesis other than a null hypothesis, which is further explained in Section III.

STRUCTURE OF JOURNAL ARTICLES

The third area of inconsistency we venture to improve is the structure of journal articles. Action research articles are often organized using the five steps of a cycle (Figure 1) as headings and repeating them for each cycle. This intensive research [Markus and Lee 1999] generates a large amount of information for each step. This unique organization, with a new set of sections for each site, may create reading difficulties for researchers, reviewers, and practitioners. In the spirit of integrative frameworks called for by Lee [1991], the mutually supportive features of action research and positivist reporting are combined for appeal to a broader audience. To illustrate the possible differences in formatting, Figure 2 compares typical sections in a positivist journal article to the typical sections in a small, two-site, canonical AR article, either positivist or interpretive.

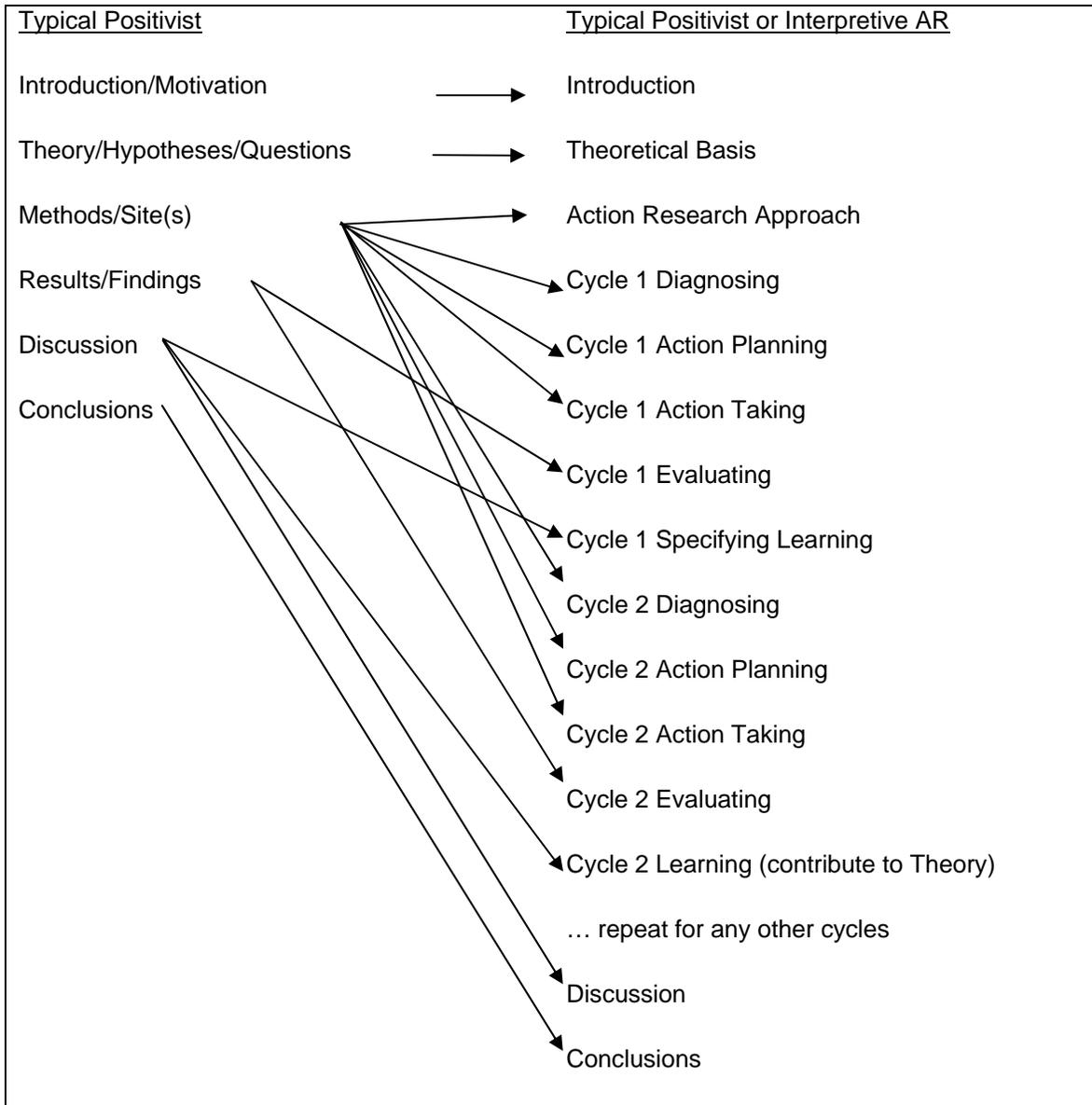


Figure 2. Comparison of Typical Journal Articles

Figure 2 shows that AR articles generally contain multiple sections, including five sections for each AR cycle or site. The sections do not map as a positivist audience would expect. The arrows illustrate that a reader must jump back and forth to find methods, results, or discussion. This arrangement frustrates readers, including experienced AR researchers, who have to track information through the many sections. In Figure 2, seven different sections contain information positivists might expect to find in the Methods section of an article. To make matters more difficult, even the most exemplary set of articles will not consistently include the same information in the same section.

One such set of articles is found in the *MISQ* Special Issue on Action Research [Baskerville and Myers 2004]. Authors and reviewers are applauded for advancing the field with six exemplary articles, meeting high standards for criteria for AR and qualitative research. Every article reports on “intensive” research with strong attention to theory and makes practical contributions to the

organizations and industry in which the research was conducted. Yet, in terms of sectional content, the articles are illustrative of the variability that may cause readability difficulties.

Readability is aided by providing, in the introduction section of an article, a shared understanding of the form of AR undertaken (see Table 1). Only one of the *MISQ* special issue articles does this. Of the remaining articles, two state that they use an ancillary form of AR; one article saves its reference for the methods, and one article does not state its type, although it is in the table. Two articles state that they are introducing new forms of AR.

The theory sections of the special issue come with a variety of names – Conceptual Framework, Theoretical Perspective, Framework, part of the Introduction, or a Section Named after a Theory. None contain hypotheses or questions in the theory section as generally expected by a positivist audience. One article places a question in the introduction.

Methods are called *Method* or *Approach*. These sections generally include a description of AR. Four of the articles state that they are interpretive. Criteria for evaluation of AR are listed in a variety of places: in methods, in the discussion, in a special section, in the introduction, and in an appendix.

Results sections are also called Case Study, Multiple Site Names, Multiple Cycle Number, Reporting, Research Practice/Results. One article refers to working hypotheses here. Another refers to propositions.

For the discussion and conclusions sections, four articles offer two or more sections, variously called Analysis, Concluding Discussion, Contributions, Implications, Discussion, and Conclusions.

As one can deduce from the set of AR articles described above, each article is distractingly variable from the others. By condensing reporting of AR studies into the sections found in a typical positivist article, and focusing on a single theory, both space and inconsistency problems may be addressed.

III. THE THEORY SECTION

THEORETICAL BACKGROUND

AR is typically viewed through an interpretive lens and is rarely positivist. Before 1995, AR and interpretive research did not emphasize literature reviews or theoretical background. However, research based on newer criteria [Walsham, 1995; Eden and Huxham 1996; Klein and Myers 1999; Davison et al. 2004] moved in that direction. Some published research will contain a theoretical starting point and some will not. One might argue that a theoretical basis is an effective way of limiting the scope of large amounts of data (virtually unprocessable amounts of data) generated by a multi-cycle project [Myers 1997]. Theory may also be generated from a study. Front-end Loaded Multi-grounded Theory [DeLuca et al. 2007] provides for initial theory and theory grounded in the data.

A comparison of what is typically found in an interpretive AR article and what we suggest for a positivist AR article is shown in Table 3. Table 3 illustrates to positivist readers why some AR research may not fit expectations for article content but may still make a valuable contribution to knowledge in any of a variety of ways, including subjective, interpretive, and positivist understanding [Lee 1991].

Table 3. Comparison of Interpretive and Positivist Action Research

AR (typically Interpretive)	AR (rarely Positivist), we suggest:
Often not a priori literature review	Literature review
Often not a priori theoretical basis, often no hypotheses	A priori theoretical basis/ hypotheses
AR cycles	AR cycles
Qualitative data	Qualitative and quantitative data
Tell story	Tell story
Often not generalized	Generalize to theory, extend

In the theory section of an AR paper, we focus on the need for a literature review and a theoretical basis for AR. As Walsham [1995] indicates, theory may be used throughout the research process, as an initial guide, an iterative process through data and analysis, and as a final product of the research. We can gather evidence that may corroborate existing theory and develop new theory in the same or different AR cycles (but may not fit it all in the same article!).

HYPOTHESES

Positivists generally expect hypotheses for quantitative data and research question(s) for qualitative data. Creswell [2003] recommends both hypotheses and research questions in a multi-method study. Lee [2005] suggests moving research “hypotheses” in a more general direction using an over-arching term of “premises.” We agree philosophically and logically with moving research in over-arching directions; however, the political view discussed in the introduction will guide our suggestions in the positivist direction at this time.

Many positivists in IS expect hypotheses to be of the null hypothesis (H₀) form. In the psychological literature, this type of hypothesis has been strongly criticized by Kluger and Tikochinsky [2001]. They indicate that accepting a hypothesis by rejecting its null hypothesis hampers research and reduces public trust in research. They suggest a return to a common sense hypothesis. We suggest writing a (post-positivist) hypothesis that is not a null hypothesis, and that it meet three criteria suggested by Briggs and Dean [2005]. Each hypothesis should :

1. include a comparison;
2. include a prediction; and
3. be worded in a fashion that is falsifiable [Popper 1992; Lee 1989a].

Hypotheses may then be either supported or questioned according to the evidence. For example:

H1 – Teams that brainstorm product innovation ideas in the presence of pounding on the walls will produce fewer usable ideas than teams who brainstorm in silence.

H2 – Teams who use asynchronous electronic communication media to develop new products will obtain a higher success rate than teams that use the face-to-face communication medium.

Each hypothesis compares one circumstance to another and a prediction of some outcome that is measurable. It is possible for the statements to be false and for someone to find evidence that indicates such; thereby they are falsifiable. Instead of (or in addition to) a measurable outcome, the outcome may also be based on something observable or based on participant perceptions or on other specified operationalizations.

IV. THE METHODS SECTION

CRITERIA

The methods section of a journal article generally includes detail on the research setting and actions taken, the data collected (qualitative and quantitative), and how it was analyzed (coding and statistical techniques). In the methods section of an AR article, we recommend incorporating an explanation of the first three stages of the AR cycle:

- diagnosing the detailed problem (the general problem is in introduction);
- action planning; and
- action taking.

This would include site descriptions and the role of the researcher. Noting interactions with participants allows the reader to assess potential researcher bias inherent in any study. In addition, each type of AR may have unique criteria by which it is judged. The methods section is perhaps the best place to elaborate on how those evaluation criteria will be met as part of the plan of action. This tutorial is guided by suggestions from Baskerville and Myers [2004], Davison et al. [2004], DeLuca et al. [2007], Eden and Huxham [1996], Lau [1997], and others. As indicated in the introduction section, this tutorial suggests:

- consistent use of action research vocabulary;
- consistent use of information systems research paradigm vocabulary; and
- consistent use of general article formatting aimed at a broad audience.

MULTI-METHODS

Just as the concepts of research approach and epistemology are not tied together [Klein and Myers 1999], Germonprez and Mathiassen [2004] point out that research methods are not tied to epistemology. Quantitative or qualitative methods may be used with any epistemological perspective.

With the aim to mitigate risk, we suggest choosing methods with different threats to validity [Mingers 2003; Cook and Campbell 1979]. Qualitative data is generally text-based data, where quantitative data is generally numeric. Qualitative data/methods, generally provides the depth of narrative, gives a situational explanation, but lacks measure/categories [Patton 1987]. Quantitative data/methods gather numerical values generating statistics/measures. The results from use of any one method could lead to misunderstandings, even false conclusions, if used in isolation. For example, a validated scale with acceptable reliability quantitatively, measured little difference in the influence of individuals on the group when comparing perceptions using asynchronous electronic communication media to face-to-face communication medium [DeLuca 2003]. Interviews qualitatively showed two important canceling effects: increase in positive individual influence, and decrease in negative individual influence. A numerically neutral value was counterproductive and not indicative of the dual phenomena. In the study, related scales yielded results consistent with the qualitative data and were valuable in yielding a quantitative measure for the strength of perceptions.

QUALITATIVE METHODS

Qualitative methods, the primary methodology in “intensive” research [Markus and Lee 1999], offer the “power to explain what goes on in organizations” [Avison et al. 1999, p. 94]. They occupy an established place in IS research as represented by the ISWORLD Qualitative Research Web site [Myers 1997]. Myers contributes significantly to understanding the

methodology. He spells out common problems of qualitative methods, including: 1) a significant mass of data (exacerbated by multi-methods); 2) space constraints of a typical journal article; and 3) interrelated multiple findings. As discussed earlier, it is inappropriate to characterize AR by epistemology or as a qualitative approach. We believe that research approaches and methods should be categorized separately. Qualitative data collection techniques include interview, observation, and analysis of published materials, etc., each of which has the potential to generate a large amount of data.

Methods for coding qualitative data are useful if not necessary for action researchers. Large amounts of textual data must be processed from multiple sources: actual interactions; interviews; open-ended questionnaire responses; observation; and documents. The discussion of coding techniques is often complicated and dispersed throughout an action research article. We propose that they should be presented in the methods section along with the description of quantitative methods as expected by a broader audience. Coding may take the form of:

- Hermeneutics [Taylor 1979] – determine meaning of text;
- Semiotics [Holmqvist et al., 1996] (content, conversation, discourse analyses) – words assigned conceptual categories; and
- Variations on the Grounded Theory Method [Glaser and Strauss 1967; Strauss and Corbin, 1998; Baskerville and Pries-Heje, 1999; Goldkuhl and Cronholm 2003; Urquhart and Fernández 2006; DeLuca et al. 2007] (Theory is grounded in the data and other theory).

QUANTITATIVE METHODS

Qualitative and quantitative methods can be combined in many ways and much value is gained by doing so [Creswell 2003; Germonprez and Mathiassen 2004]. A primarily positivist audience is generally looking for some numbers. Even if one strongly believes that their most valuable data is textual, a number indicating the strength of perceptions will make the study more marketable to that audience. Straub [2004] contributes greatly to the field with the Quantitative ISWORLD Web site, which exemplifies general expectations with the use of the acronym QPR (Quantitative Positivist Research). AR is generally non-QPR, but that is not necessarily always true. Again, we make the assertion that quantitative methodology may be chosen separate from positivist epistemology and that these elements of a paradigm are not necessarily linked. Indeed there could also be qualitative positivist AR [Kohli and Kettinger 2004] and multi-method positivist AR [DeLuca and Valacich 2006] as we are advocating.

As with any method, quantitative methods should be chosen based on the situation. Lee [1991] recommends survey in addition to interpretive methods. To round out an AR project, we offer some additional quantitative methods for consideration:

1. Develop a seven-point Likert-type scale of statements with responses of strongly disagree, disagree somewhat, strongly agree for use in an interview questionnaire [Moore and Benbasat 1991; Nambisan et al. 1999; DeLuca 2003], then:
 - a. compute Cronbach's alpha [Cronbach, 1970] for internal reliability, and
 - b. compute average response on reliable scales.
2. Generate categorical data by wording questions to allow both a categorical response (e.g., increase, no change, decrease) in addition to a qualitative explanation, then:
 - a. use the Chi squared goodness-of-fit test [Rosenthal and Rosnow 1991] on the categories; and

b. estimate mean, statistical significance of response due to chance, and magnitude of effect size (Cramer's phi (a.k.a. V) for few categories [Howell 2002]).

V. THE RESULTS SECTION

Copious results generated by an AR study translate into problems disseminating the research in a consumable fashion. Many AR researchers and others collecting qualitative data often find the only way to tell the complete story is by writing a book [Kock 2003]. Since books are generally discouraged as academic outlets, especially for junior faculty in business schools, large amounts of information need to be condensed into a small, yet coherent journal article format.

One tool that may help in this regard is borrowed from the total quality management literature. Qualitative data from axial coding may be summarized through a variation of a fishbone diagram [DeLuca et al. 2007; DeLuca 2003; Ishikawa 1968], with hypothesized variables as vertebrae and related constructs/variables as the bones. Whatever display tools are chosen, we recommend a fit-on-one-page view.

When reporting results, it is incumbent on the researcher to seek and report evidence both supporting and questioning the hypotheses. Results must also be reported from each type of data (qualitative and quantitative). To organize all this data, we recommend the logical outline of the hypotheses. Much research is reported by data type or by site or by cycle, leaving the reader to piece it together. The reader should not be asked to work so hard and often will not. When organizing by hypotheses, however, action researchers need to be clear regarding what happened where and at what point in time⁵. This tactic is similar to a time series of events [Brockwell and Davis 1993] in the action.

VI. THE DISCUSSION SECTION

TRIANGULATION

The discussion section of an AR article is the place to boil down the results, using triangulation [Gallivan 1997] and state the contribution to knowledge for researchers and practitioners. Triangulation is the "combination of methodologies in the study of the same phenomenon" [Denzin 1978, p. 291] where two or more distinct methods enhance belief that convergent results are due to phenomenon, not the methods employed [Jick 1979] and thereby "powerfully facilitate[s] the incremental development of theory" [Eden and Huxham 1996, p. 269]. Triangulation may be performed with different measurements, with conclusions within a study, and conclusions across studies [Kidder and Fine 1987].

To facilitate triangulation or at least the understanding of what is being triangulated, we encourage a display that will be a one-page snapshot of all relevant evidence from the cyclical hypotheses testing. This evidence would include data from all cycles from both qualitative and quantitative methods, both supporting and questioning the hypotheses, organized by hypotheses, including those added in later cycles. A sample display tool is shown in Table 4. When the evidence available is greater than the space available to display it, evidence may be abbreviated with an accompanying legend.

⁵ The same information that would be dispersed in multiple sections if organized by AR cycle and stages.

Table 4. Multi-Cycle, Multi-Method Triangulation Framework

	Evidence in Support		Evidence Questioning	
	Cycle 1	Cycle 2	Cycle 1	Cycle 2
H1	1) Perceived ... 2) Perceived ... 3) Numerical Value	1) Perceived ... 2) Perceived ... 3) Observed ... 4) Numerical Value	1) Perceived ...	
+ H2	1) Observed ...	1) Perceived ... 2) Perceived ... 3) Numerical Value		1) Perceived ... 2) Observed ...

Adapted from DeLuca et al. [2007] and DeLuca [2003]

PROVING A THEORY

From a positivist understanding, a theory should be falsifiable, logically consistent, offer explanatory power, and survive attempts to falsify it [Lee 1991]. Visual inspection of the amount of evidence in a particular column provides a general assessment of support for a hypothesis. Evidence that questions a hypothesis also must be explained. Although a theory or set of interrelated hypotheses cannot be proven, a theory can survive attempts to falsify it [Popper 1992]. Lack of disconfirming evidence increases confidence in theory, where the degree of corroboration increases with number of corroborating instances (within site, multiple sites). Positive results support a hypothesis and it cannot be rejected. Negative results imply that the hypothesis may contain a flaw in one or more of the following: its interpretation, its operationalization, the research design of the experiment, or the theory itself. In this case, it would be helpful to include alternative explanations for the results in the discussion.

A significant contribution may be discovered that appears either to improve a theory or suggest a new one. This contribution should, of course, be spelled out. AR studies hold the inherent advantage that it is possible to add hypotheses for the next cycle and investigate further.

GENERALIZABILITY

Many reviewers are familiar only with positivist, quantitative research. More than one author of an article that was based on qualitative data from a natural setting has received comments that generalization is not possible [Lee and Baskerville 2003] without a typical empirical test. The literature finds otherwise. Yin [1994] describes “analytic generalization” from a single case only to theory; then theory may be generalized to a population [Lee and Baskerville 2003]. Lee and Baskerville expound four forms of generalizability: generalizing empirical statements to both empirical and theoretical statements and generalizing theoretical statements to both empirical and theoretical statements. Walsham [1995] calls for researchers to generalize in four ways: concepts, theory, specific implications, and rich insight. The idea is to garner general notions from particular instances and contribute to knowledge. Canonical AR, and its use of cycles makes it particularly suited to generalizability at the group level and generalizability of various commonalities found across cycles [Kock et al. 1997].

GRAPHICAL CONCEPTUAL FRAMEWORK

Results of the triangulation and the subsequent contribution to knowledge can be conveyed using a one-page graphic showing both planned and emergent constructs/hypotheses relative to the theory as in a typical boxes and arrows diagram similar to that shown in Figure 3.

LIMITATIONS

As for any study, the limitations of the research should be spelled out, but note that sample size is not one of them. An AR study is a richly-detailed in-depth study, which is a strength of the research.

VII. THE CONCLUSIONS SECTION

The conclusions provide a concise view framing the contribution of the paper. Action research papers using the suggestions herein not only contribute their own conclusions but also contribute to the total number of examples of an emerging research approach, as well as contributing instances of an exemplary structure. The purpose of this tutorial is to facilitate understanding among IS scholars and to produce action research results that are more accessible for researchers and practitioners alike. We do so by:

1. Calling for consistent vocabulary use in the introduction section of all articles:
 - a. explicit use and description of one of the action research types in Table 1
 - b. explicit use and description of all components of the IS research paradigm vocabulary as in Table 2.
2. Bridging the gap between epistemologies:
 - a. by describing an article structure for the distribution of the information reported for all cycles of canonical action research project into sections expected by the reading majority who are positivists, and
 - b. by employing a more (post)positivist epistemology for action research.

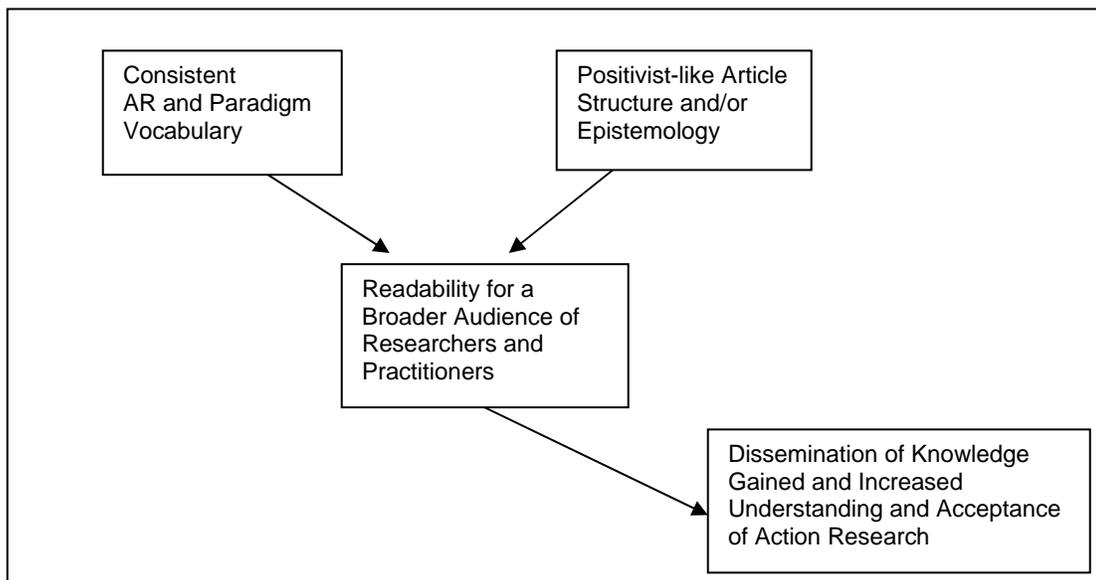


Figure 3. Graphical Conceptual Framework

We call for use of the structural suggestions as summarized in Table 5. The elements of the action research cycle are shown in bold. We have answered a call for AR conduct and reporting guidelines [Avison et al. 1999] while following criteria and principles for canonical AR [Davison et

al 2004; DeLuca et al. 2007; Baskerville and Myers 2004; Eden and Huxham 1996; Lau 1997]. The resulting quality and marketability of new AR will increase the understanding and acceptance of AR and thus contribute to the dissemination of the knowledge gained using this research approach.

Table 5. Summary of Proposed Format for Action Research Journal Article

Section	Includes:
Introduction	Motivation, definitions, site, paradigm info, type of AR, diagnose general problem area/theory/question, focus, purpose, organization of paper
Theory	Literature review for theoretical/conceptual lens, but not preclusive, constructs/variables, definitions hypotheses (comparison, prediction, falsifiable)
Methods	Guidelines/evaluation criteria for type of AR approach, role of the researcher, diagnose specific problems, action planning, action taking , sites qualitative and quantitative data collection plan
Results	Evaluation , qualitative coding and quantitative measures organized by hypotheses be clear about what happened where at what point in time include evidence both supporting and questioning the hypotheses/theory include both planned and emergent constructs/hypotheses
Discussion	Triangulation using multi-cycle, multi-method framework organized by hypotheses tell the story using graphical conceptual framework specifying learning as contribution to theory (inductive and/or deductive), contribution to practice, limitations
Conclusions	Concise view framing of the contribution of the paper

We call for consistency in vocabulary:

1. for a regularly updated list of types of AR as in Table 1, so that researchers may develop a common understanding of various types and be able to report them using that common language; and
2. for paradigmatic characterization consistency as in Table 2, suggesting AR be classified as a research approach.

Our suggestions are not only likely to make action research more publishable, they may indeed make action research projects more fundable. The National Science Foundation (NSF), a major research funding organization in the U.S., called for methodological innovation to strengthen qualitative research [NSF 2004a; 2004b]. The NSF Web site specifies eight recommendations that a funded research program meet [NSF 2004a, pp. 5-6]. NSF is most insistent that a research project start with a theoretical basis (as we recommend in Section III), rather than traditional inductive grounded theory. Table 6 lists the recommendations that NSF-funded qualitative researchers are expected to follow and how our recommendations satisfy them.

Table 6. Comparison of NSF Recommendations and Our Recommendations

NSF Recommendations	How our Recommendations Satisfy
Write for a broad audience	Use positivist-like article structure (Table 5) expected by majority of researchers
Situating relative to existing theory, literature and contribution	Theoretical basis and hypotheses as in theory section
Outline research procedures and feasibility	Mutually acceptable framework in introduction and methods
Describe data and plan for analysis	Qualitative and quantitative methods
Provide a strategy to construct theory	Theoretical basis, coding methodology and results, Front-end Loaded Multi-grounded Theory in results and discussion, triangulation in discussion, new hypotheses and/or theory from the discussion and in the conclusions
Seek and interpret disconfirming evidence	Confirmatory and disconfirmatory evidence presented for each hypotheses in results and integrated in discussion
Indicate the impact of research	Contribution, lessons learned and generalizability to research and practice in discussion and conclusions
Provide information for replicability of research and value as an archival record	Consistent vocabulary for type of AR and IS research paradigm (Tables 1, 2); falsifiable hypotheses from theory or conclusions sections may be retested; consistent overall article structure (Table 5) provides archival format for easier reference in future studies

The above comparison between our suggestions and those of the NSF demonstrate that our suggestions for publishability may also positively affect fundability.

We encourage more action researchers to consider using a (post)positivist epistemology, and for more positivists to consider using an action research approach. We believe our suggestions will be instrumental in facilitating the publication of action research and thus more researchers and more practitioners will be able to benefit from action research studies.

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LIST OF ABBREVIATIONS

AR	Action Research
H1	Hypothesis 1

MISQ	Management Information Systems Quarterly
NSF	National Science Foundation
IS	Information Systems
ISWorld	Information Systems World
IT&P	Information Technology and People

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