

Three Dimensions of Research Quality

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Proceedings of the International Conference: Doing Research in Applied Linguistics

Abstract

Research quality is currently an area attracting a lot of interest. Previous studies have looked at research quality mainly from two perspectives: as a measure of research productivity and performance (e.g. citation analysis) and as a guide for research quality development (e.g. reviewers' comments analysis). While acknowledging the usefulness of the first, this paper focuses on the latter with the goal of identifying directions for professional development. Through reviewing previous studies related to research quality and guidelines for publishing, as well as looking at research articles published in international journals, this paper reveals research quality from three dimensions: research procedure quality (e.g. establishing validity and reliability), research presentation quality especially concerning the writing up of research (e.g. clarity of research purposes, clarity of findings), and researching quality (e.g. awareness of decisions taken, consideration of methodological strengths and weaknesses). The last of these is a characteristic of research quality that has not been paid much attention previously, and the implications of researching quality for the professional development of researchers are considered.

Introduction

“What are the touchstones by which you judge quality or rigor in education research?” (Moss et al., 2009, p. 51)

This question is simple, yet fundamental as the criteria for research quality are a principal component of the process for creating research-based knowledge. Several researchers in various disciplines such as Bryman (2006) in social science, Carter and Little (2007) in health studies, Creswell (2005) in education, and Shohamy (2004) in applied linguistics have attempted to propose their touchstones in judging research quality. These researchers, although working in different fields, share a common concern for research quality.

Research quality can be assessed from two aspects: research and research impact. The former is related to the quality of a research manuscript for publication and the quality of published research articles. To evaluate this aspect, a list of quality criteria is used. The latter is concerned with research productivity of a certain researcher or institution. This aspect is measured after research is published by counting the number of citations. While acknowledging that both receive a wide interest in research communities at present, this paper focuses on the former with the intent of identifying dimensions of research quality, which hopefully can lead to research development.

Most researchers aim to produce quality research with a goal of having their research papers published in a refereed journal. They, particularly the novice ones, tend to rely on guidelines of how to conduct and publish research (Murray, 2009), which are provided in most of the research method books or some journals such as TESOL Quarterly (see Chapelle & Duff, 2003). Suggested in these guidelines are generally important issues in conducting and reporting research. Critical issues in conducting research are reliability and validity in research (Dörnyei, 2007; Nunan, 1992) (reliability and validity are broadly used in this paper to cover the similar ideas but expressed in different terms in different research paradigms such as dependability, confirmability, credibility, or transferability). These two concepts are concerned with a research procedure quality dimension. For reporting research, several linguistic issues including clarity and coherence, or such interpersonal issues as stance and engagement are essential. These issues fall into a research presentation quality dimension. In this paper, we will

discuss these two dimensions of research quality, but also argue that they are not sufficient. We will then call for an additional, but perhaps overlooked, dimension, which is researching quality.

Importance of assessing research quality

Assessing research quality is of importance in academic communities. From a research accountability perspective, such assessment can suggest recommendations to improve the conduct and value of research (Moyer & Finney, 2005). From a research utility perspective, it can help us be better informed of findings that can be useful for our practices. For instance, in education, research that is of quality can increase our understanding of learning and teaching (Kervin et al., 2006), leading to improved teaching strategies or techniques.

“Unfortunately, general agreement about research quality in scholarly circles stops at the recognition of its importance” (Dörnyei, 2007, p. 49) as there is no guideline that provides a universally accepted convention in judging research quality (Denscombe, 2003). However, although no consensus on such convention exists, from our survey of a wide selection of literature related to research quality (e.g. Best & Kahn, 1986; Bryman, 2006; Chapelle & Duff, 2003, Creswell, 2003; Dörnyei, 2007; Kervin et al., 2006; Lankshear & Knobel, 2004; Lazaraton, 2003; Mackey & Gass, 2005; Nunan, 1992; Richards, 2003; Smagorinsky, 2008; Seale, 1999; Seliger & Shohamy, 1990; Wright et al., 2004), it seems there are, arguably, two agreed dimensions in judging research quality: research procedure quality and research presentation quality.

Research procedure quality

The first dimension is research procedure quality. This generally relates to ensuring the reliability and validity of research. To do this, researchers are expected to follow certain procedures in collecting and analyzing data, which are influenced by research approaches. We therefore need to consider research approaches when assessing research procedure quality (Sale & Brazil, 2004). There are several ways to distinguish approaches, but we follow the distinctions that are common among diverse fields which refer to quantitative, qualitative, and mixed methods (Creswell, 2003; Dörnyei, 2007; Fraenkel & Wallen, 2007).

In using a quantitative approach in conducting research, quantitative researchers basically embrace a positivist view of knowledge. Positivists believe that there are patterns, causes and consequences (Denscombe, 2002) and “that physical and social worlds exist in a given way and that through the rigorous and expert application of research procedures we could come to know these worlds more or less as they are” (Lankshear & Knobel, 2004, p. 361). Grounded in this belief, quantitative researchers mainly aim to explain cause-effect phenomena (Fraenkel & Wallen, 2007), and strive for universal laws. Its general practices include tallying, a priori categorization, intervening in the research context and controlling variables, using statistics, and standardized procedures to assess objective reality (Creswell, 2003; Henning, 1986).

These practices then reflect the idea of reliability and validity which are vital in establishing research quality of quantitative research (Burns, 1999). Such practices as data collection and analysis must be consistent (internal reliability) so that reproducing a study and obtaining results similar to those produced in the original study is guaranteed (external reliability). Examples of strategies used for increasing reliability, a prerequisite for validity (Mitchell & Jolley, 2010), include random sampling, test-retest of the instrument, and inter-rating of the analysis (Gibbs, 2007). These strategies, however, do not guarantee validity. Thus once reliability is established, quantitative researchers need to ensure validity which covers internal validity (the interpretability of research – that is, “can any differences which are found actually be ascribed to the treatments under scrutiny?”) and external validity (“the extent to which the results can be generalized from samples to populations”) (Nunan, 1992, p. 15). Validation strategies in the quantitative approach, which are employed to avoid errors and bias

and guard against threats to validity (see Best & Kahn, 1986), vary and rely on rigorous adherence to methodological rules (Angen, 2000).

Although quantitative researchers may have methodological rules to follow, Chance (2000) recommends some mental habits for researchers when thinking about statistical reasoning such as considering how best to get meaningful and relevant data to answer the research question, reflecting constantly on the variables involved, or being skeptical about the data obtained. This suggestion implies that simply following the standard practices may not be sufficient for quantitative researchers to establish their research reliability and validity.

Contrasting with the quantitative approach is the qualitative approach. Qualitative researchers primarily hold constructivist perspectives (i.e. the multiple meanings of individual experiences) (Creswell, 2003). These researchers believe that knowledge is value-laden and context-bound as a particular social environment in which people live can influence what they do and how they act (Burns, 1999; Smith, 1987). Founded in such beliefs, qualitative researchers aim to explore and understand phenomena. This goal is common among the multiplicity of qualitative approaches (Flick, 2007) such as ethnography, action research, case study, or conversation analysis (see Richards, 2003). Despite their variety, the qualitative approaches share common practices which are collecting open-ended, emerging data with the primary aim of developing themes from the data.

Imbedded in such beliefs and influenced by qualitative research practices are different conceptions of 'reliability' and 'validity'. To further explain, since knowledge is viewed as context-bounded, external validity is irrelevant (Moret et al., 2007) and thus strategies used in quantitative research such as random sampling are inappropriate (Gibbs, 2007). In terms of research practices, the qualitative approaches are "more simultaneous, nonlinear, and iterative" (Croker, 2009, p. 10), whereas the quantitative approach is characterized as being linear and less iterative. Aware of these philosophical and practical differences, some qualitative researchers attempt to re-conceptualize 'reliability' and 'validity' by providing substitutions such as dependability (internal reliability), confirmability (external reliability), credibility (internal validity), transferability (external validity) (Lincoln & Guba, 1985), or by suggesting new criteria such as authenticity, particularity, or reflexivity (see Patton, 2002). Despite these attempts, the problem of how to assess the quality of qualitative research has not been solved (Flick, 2007). In fact, they may cause more confusion due to the proliferation of terms (Dörnyei, 2007). While acknowledging problems of qualitative research quality benchmarks exist, qualitative researchers still need some guiding criteria to establish their research quality. Rather than discussing various lists of the new terms, we stick to the terms 'reliability' and 'validity' but keep in mind the constructivist view of knowledge.

To ensure reliability or validity in qualitative research is neither simple nor straightforward as different researchers suggest different strategies. For example, Richards (2003) recommends three key strategies: member validation (i.e. seek views of members of accuracy of data gathered, descriptions, or even interpretations), constant comparison (i.e. keep comparing codings with other codings and classifications, looking for new relationships, properties), and negative evidence (i.e. seek out negative evidence/cases and assess their relevance to interpretations). Dörnyei (2007) suggests leaving an audit trail, contextualization and thick description, identifying potential researcher bias, examining outliers, extreme or negative cases and alternative explanations, respondent feedback, and peer checking.

What the two examples of the strategies may leave qualitative researchers with is a wide range of strategies with unclear directions of how many and which strategies to use. For instance, researchers doing conversation analysis may find it difficult to have member validations. Therefore, consideration is needed when applying these strategies to establish 'reliability' and 'validity'.

The third research approach is the mixed methods. Mixed methods researchers tend to base knowledge claims on pragmatic grounds (i.e. problem-centered and pluralistic) by

combining quantitative and qualitative approaches to best understand research problems, rather than on a particular philosophical view of knowledge (Croker, 2009). Their idea, however, is not shared by some researchers who see that such a combination is not compatible. But arguing over this matter may not be productive (Allwright and Bailey, 1991; Onwuegbuzie, 2005; Perry, 2005) for the situation today is less quantitative versus qualitative but more on how research practices lie somewhere on a continuum between the two (Creswell, 2003).

The mixed methods approach, although not having its own quality criteria (Sale & Brazil, 2004), needs to ensure its research procedure quality which refer to establishing 'reliability' and 'validity' (Ivankova & Creswell, 2009). To ensure their research procedure quality, mixed methods researchers can apply procedures specific to each research approach. However, this may not be sufficient. Their combined approach requires one more strategy to enhance 'reliability' and 'validity' which, as it is claimed, is triangulation (Watson Todd, 2003).

The use of the term 'triangulation' in research appeared in the 1970s during the breakthrough of the mixed methods approach (Dörnyei, 2007). Its three purposes are to identify valid data sources and methods, to compare different findings, and to identify reliable and valid findings (see Watson Todd, 2003). Nevertheless, simply using triangulation may not be satisfactory as Dörnyei (2007) suggests mixed methods researchers may need to include 1) the justification for mixing methods, 2) the justification for the specific mixed design applied, including the choice of the particular methods, and 3) the quality of the specific methods making up the study. This suggestion implies that the strategies for validity and reliability for this approach may extend beyond applying the fixed criteria but require a justification for their conduct.

From our discussions of the three approaches, we hope to have shown two main essential issues involved in research procedure quality dimension. Firstly, it is difficult to judge the quality of one by using the criteria of the others since each research approach has its own views and standards of research (Collingridge & Gantt, 2008). Secondly, strategies for making research reliable and valid may not be simply a technical issue but need consideration and justification.

Research presentation quality

A second dimension concerns research presentation quality. In presenting their research, researchers in fact are describing information and revealing their attitudes toward the materials being talked about at the same time. This dimension then deals with two related issues: text-oriented and interpersonal-oriented.

The text-oriented issues involve clarity and coherence. These two concepts are essential in research report writing (Cozby, 2003; Wetherell et. al., 2001). They are both explicitly stated and implied in guidelines for writing up research, although they are not clearly defined. Examples of clarity are such questions as (Mackey & Gass, 2005)

1. Are all of the terms clearly defined and operationalized, with examples wherever space permits?
2. Are each of the variables clearly defined?
3. Are the data clearly summarized and presented in the report?
4. Is the design explained in sufficient detail to permit replication wherever possible?
5. Are sufficient biographical details on the participants provided so as to permit replication?

An example of coherence is

6. Is my writing coherent? Are related ideas linked with transitions? (Rozakis, 2007)

Questions like these are prevalent in research writing manuals, although they seem to deal with general and mechanical issues of writing, rather than research quality. However, since they are widely suggested, they would appear to be a necessary aspect of effective research writing and thus a component of research quality as Borg (2010) suggested.

Another issue under this dimension is the interpersonal-oriented which is “concerned with interpersonal uses of language and how the subjective presence of the writer or speaker intrudes into communication to convey an attitude to both those they address and the material they discuss” (Hyland & Diani, 2009, pp. 4-5). It has been studied under various headings such as ‘hedging’ (Hyland, 1998), or ‘stance’ (Johnstone, 2008; Hyland, 2005). Whereas these important linguistic features are related to research presentation quality, it is difficult to judge their impact on enhancing or reducing research presentation quality. For example, having realized the importance of hedging in research writing, Hyland (1996) studied forms of hedging by exploring 26 science research articles. He found that there are considerable forms of hedging expressions and their functions are indeterminate. We can now see that although hedging is an important element in presenting research and the use of it can affect the quality of research presentation in a way that the reader may accept or reject our claims in research, it is not clear what criteria we can use to judge how research quality can be affected by hedging. Researchers then have to rely on their own discretions on this matter when presenting their research, as do readers when evaluating research quality.

Need for a third dimension

In the previous sections, we have discussed two research quality dimensions based on the literature. We have seen that both dimensions include aspects that vary in terms of conformity of application. For research procedure quality, for instance, simply following the rules for establishing reliability and validity in much quantitative and qualitative research is generally acceptable, whereas validation procedures in mixed methods research may require extensive justification. Similarly, for research presentation quality, the need to clearly define variables or describe data collection and analysis is generally accepted, but the extent to which researchers should express their stance in writing is a matter for the researchers to decide. These parallels suggest that there may be an additional dimension affecting overall research quality which concerns, at a minimum, principled decision making and justification in research.

To investigate whether such a third dimension exists, we can look at extracts from published research that are similar on the first two dimensions, but which may have differences in overall quality. The following extracts are selected, based on their comparability of contents in three areas: participants’ selection, instrument, and data analysis. The sentence numbers have been added to the extract for ease of discussion.

Participant selection

(A1) The target subject [sic] was the 40 second-year students majoring in English at xxx University. (A2) The research divided the students into two groups by pairing students’ scores taken from the pre-requisite course which students had studied previously with the same teacher at the same semester. (A3) Each group contained students of high, middle, and low levels. (A4) The two groups were also pre-tested to compare their English reading comprehension ability. (A5) The results of the test of each group were computed by using T-Test to find the means and the standard deviation. (A6) The researcher randomly selected the group to assign either the SRA reading material or Internet-based reading supplementary. (Simpson, 2004)

(B1) In order to control the number of variables in the study, two groups of participants were selected from the same L1 cultural and educational background. (B2) Choosing to keep these linguistic and sociological variables constant while varying the level of L2 proficiency meant that the mean age and the educational attainment of the two groups were different, and this can be seen as a weakness in the design. (B3) The older, more academically advance group is virtually guaranteed to comprehend somewhat more skillfully than the less advanced group, even in L1, and this needed to be taken into account in the

analysis of results...(B4) The lower-intermediate group of participants consist of 19 adolescents (13 girls and 6 boys, mean age 14 (Walter, 2004)

In this set of extracts, we can see that A and B have both research procedure quality and research presentation quality dimensions. As regards the first, both attempt to ensure validity by having a random sampling (A6) and trying to control the number of variables in the study (B1). For the second, both A and B quite clearly describe the research participants, the criteria used for the participant selection, and the ways for the participant grouping.

However, unlike A, B presents more than what is required for the two research quality dimensions. While A seems to merely report procedural steps in selecting the research participants, B reveals an awareness of the purpose in selecting participants (B1), a consideration of a methodological weakness (B2), and an awareness of the implications of methodological decisions (B3) which are related to the participant selection decisions and can have an impact on the following step in research. This revelation corresponds to one of Chance's (2000) suggestions that we discussed earlier regarding reflecting on the variables involved. The kind of practice which exists in B but not in A seems to enhance the quality of research reported in extract B.

Similar practices that seem to enhance research quality are also found in other areas of research decisions, apart from the participant selection, such as using research instruments.

Instruments

(C1) Observation sheet: This was used to find out what strategies the teachers actually used in giving feedback. (C2) It was written in English and consists of seven feedback strategies (adapted from Richards & Lockhart, 1994: 189) (see appendix). (C3) Ranking scale form: The ranking scale form was a survey on the teachers' beliefs about feedback strategies. (C4) Its objective was to find out what strategies teachers believed they used in giving feedback. (C5) This instrument consists of the same seven feedback strategies as in the observation sheet. (Kaoropthai & Srimavin, 2007)

(D1) I obtained think-aloud protocols on reader processes as well as on vocabulary learning during and after reading. (D2) For learning strategy researchers could focus not only on strategic behaviors but also on the decision-making processes that lead to these behaviours, the use of verbal reports, arguably the set available means to get into the learner's mind, so to speak, is standard practice (Cohen, 1998). (D3) Most concerns about verbal reports centre on the intrusive effect of think-aloud techniques (see Ericsson & Simon, 1993, for a review of the pros and cons of verbal reports). (D4) However, relative to tasks on cognitive processing, thinking aloud should intrude less on tasks that focus on the conscious strategies being attended to. (D5) In addition, careful planning and training, and thinking aloud at sentence intervals, help reduce the intrusive effect (Cohen, 1998). (Gu, 2003)

(E1) The first instrument was the Motivation Questionnaire..., adopted from Schmidt et al.'s (1996) motivation measure. (E2) Schmidt et al.'s motivation was chosen because it was developed based on models in motivational and educational psychology which specifically referred to the motivation/attention interface, such as Keller (1983)...(E3) Since their motivation measure was developed for Egyptian learners of EFL, however, some of the items were changed so that they were more suitable to the EFL learning context of Japan. (E4) As a result, from the original 50 items in Schmidt et al.'s questionnaire, I reduced the total number of items to 47. (Takahashi, 2005)

Comparing C and D, we can see both describe what instrument is being used and the purpose of using such instrument. Judged in terms of research presentation quality dimension, both can be seen as clear and coherent. However, they have some differences. That is, D shows

more consideration in using the instrument by providing a justification for the instrument (D2 and D4) and showing a consideration of methodological strengths and weaknesses (D3), while C does not.

Looking now at C and E, we can see both use adapted instruments. Nonetheless, two differences can be detected. Whereas E provides a justification for the instrument (E2), and reveals a consideration of the instrument appropriacy in the research (E3 and E4), C does not.

Considering the differences and similarities among C, D, and E, we can see that while C merely describes the instrument and its purpose, D and E extend beyond such simple description by revealing consideration of the instruments' strengths and weaknesses and their appropriacy, as well as providing justifications for their use. By revealing (or not revealing) this information, we can see how certain practices (e.g. consideration of the strengths and weaknesses or sharing the basis for decisions) may affect researchers' decisions about the extent to which they may present themselves and engage their research potential readers, "pulling them along with their argument" (Hyland, 2005, p. 176). From this, we may be able to say that D and E have a higher quality than C as Denscombe (2003) asserts that "researchers need to demonstrate to the reader the nature of decisions taken during the research and the grounds on which the decisions can be seen as 'reasonable'" (p. 273).

In addition to the participant selection and the instruments, we find some practices that seem to increase research quality in the data analysis.

Data analysis

(F1) To identify the genre moves from the transcripts, firstly, the transcripts were segmented to identify the stages in consultations. (F2) Then, the function served by each stage was identified. (F3) This process was conducted recursively. From the stages and functions of stages identified through this process, the frequently occurring functions or genre moves were found. (F4) Any moves which occurred in over 80% of consultations were included as the standard genre moves within the consultations. (F5) Other functions of stages which occurred less frequently were included as optional genre moves within the overall genre of consultations. (Ngonkum, 2001)

(G1) Typically, journal or diary studies belong in the anthropological or ethnographic research tradition (Chaudron, 1988; Long, 1993) where no previous hypotheses have been formed and themes emerge from the data (Murphy-O'Dwyer, 1985). (G2) In other words, a corpus of journal data is analysed for recurring patterns and salient event which are not predetermined (Bailey, 1990). (G3) Journals, then, are instruments typically used for hypothesis generating rather than hypothesis testing. (G4) However, the purpose of this paper is to see the extent to which the use of journals as input for participant comments serves the six posited purposes given above. (G5) These six purposes, then, provide hypotheses to be tested and predetermined themes to be investigated. (G6) The corpus of journal comments will be analysed in relation to these themes, and the frequency and saliency of comments relating to the themes must be taken into consideration. (Watson Todd, 2004)

Both F and G reveal generally clear and coherent description of data analysis, and an awareness of their practical orientations of analyzing their data (F3 and G2). They thus seem to have research presentation quality and research procedure quality. However, there appear to be some differences between the two. Firstly, while F mainly describes steps in analyzing data, G discusses the relationship of data and their research tradition (G1), and the implications of the tradition on the way the data are supposed to be analyzed (G2 and G3). This discussion is an indication of a clear understanding of relationship between the nature of data, the data, and the standard practice of analyzing the data, which cannot be found in F. Secondly, F makes an important decision in the analysis (F4), but does not justify why 80% is the cutoff point whereas

G provides the reason for the crucial decision (G4 and G5). Not providing the justification for certain decisions made then can affect the clarity of research. Thirdly, in describing the process of data analysis, F does not refer to other parts of the research, whereas G links the analysis with the research purpose, making the research more coherent. These practices seem to have an impact on research presentation quality.

One additional point worth discussing here is that G seems to violate the standard way of analyzing the data as it seems not fit for the research purpose. It is clear that the researcher is well aware of this as can be seen in G1, G2, and G3. However, the research provides the justification for this violation of the standard practice (G4 and G5), although the strength of justification can be arguably debatable. This point marks the importance of the need for consideration of, rather than simply following, quality criteria established and bounded by procedures of research approaches.

From these example extracts of research articles, we can see some quality differences that extend beyond the two dimensions. These differences include an awareness of implications of methodological decisions, a justification for the instrument, a consideration of methodological strengths and weaknesses, a consideration of the instrument appropriacy, and an awareness of practical implications bounded by research approaches. These practices seem to receive little attention when people think about research quality. This is the reason why we call for a need for a third dimension, or as we call it ‘researching quality’.

Researching quality

Indeed, the characteristics discussed in the previous section exist not only practice, but also in literature as some researchers have proposed. For instance, Borg (2010), Edge and Richards (1998), and Smith (1987) suggest that we provide a justification of the methods chosen, think about their underlying assumptions, and be aware of their limitations since research methods are not guarantors of truth, and are normally used inventively according to the situation. In the same vein, Clough and Nutbrown (2002) write a book explaining that researchers need to think about their ‘methodology’ not only their ‘research methods’. They suggest that “...methods as being some of the ingredients of research, whilst methodology provides the reasons for a particular research recipe” (p. 22). Hall (2002, p. 128) asserts that one essential aspect of research expertise involves being “aware of the theoretical premises embedded in different approaches”. Similar to Smith, Clough and Nutbrown, Brewer (2000) proposes discussing the reasons for choices made and what implications for the research findings follow from these decisions, but further suggests considering the grounds on which knowledge claims are being justified, and the strength and weaknesses of their research design and strategy. In spite of some differences among terms and ideas suggested, what these researchers share is probably a common concern that is raised by Denscombe (1998, p. 3) that “the social researcher is faced with a variety of options and alternatives and has to make strategic decisions about which to choose”.

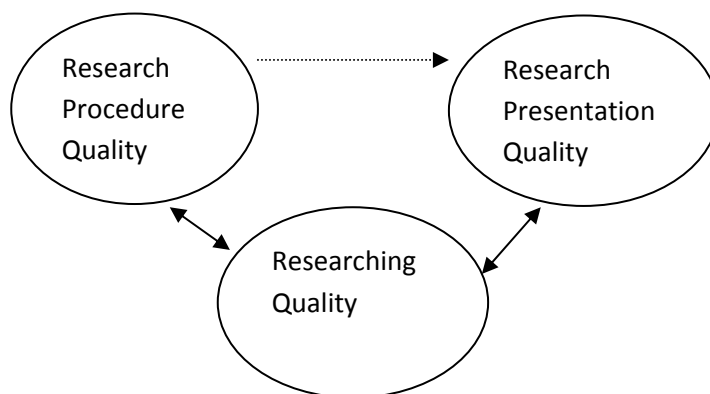
What we can draw from our discussions about the practices revealed through the extracts and the practices suggested in the literature is two important points. Firstly, it is clear that practices that seem to enhance research quality such as showing the theoretical awareness of the method, or considering the methodological strengths and weaknesses exist. Secondly, these practices are not necessarily limited to the research design but can possibly be applied in all stages of the research as implied by Brewer (2000) and Descombe (1998) such as considering the bases for justifying knowledge claims or being aware of differing views of a theory while reviewing literature. These practices can be indicators of ‘researching quality’, although we are still not clear how many of (or to what extent) these practices should be exercised to ensure overall research quality.

These practices have much in common with epistemic reflexivity which suggests that researchers should be reflective about the implications of their methods and decisions made in

research. It requires us to think about such questions as: “How has the research question defined and limited what can be 'found?' How have the design of the study and the method of analysis 'constructed' the data and the findings? How could the research question have been investigated differently?” (Willig, 2001, p. 10). These reflexive questions are useful but how they can be enacted by research practice is less clear (See Maton, 2003; Finlay, 2002). Two differences between and epistemic reflexivity and researching quality are: firstly, while the former is generally taken as being post-research to improve future research, the latter is while-research, and secondly, epistemic reflexivity has little to say about how research is written up whereas researching quality does consider this.

Researching quality then is related to research procedure quality and research presentation quality in a way that it can enhance the research procedure quality and research presentation quality. That is, it can help us understand the nature of research, explore alternatives in research, be aware of our decisions and their implications, as well as constantly shape our thinking in conducting and presenting our research, leading to improved research quality overall.

Figure 1 Relationship of three dimensions of research quality



To see whether this dimension of research quality is worth paying attention to, let us consider two studies. The first study is by Koro-Ljungberg et al. (2009). They investigated some published qualitative research and found that there are problems with lack of epistemological awareness and instantiation of methods (lack of connection between research questions/purposes and the chosen theoretical perspective/ lack of connection between data collection methods and the chosen theoretical perspective) and uninformed methodological ambiguity (e.g. theoretical perspective was present but did not have a function). Thus, although these studies follow research procedures and, given that they are published, have adequate research presentation quality, they still have some serious shortcomings. These drawbacks concern researching quality.

The second study is an on-going study. Based on some evidence that Thais cannot get published in international journals and by implication may have problems with overall research quality, this study uses content analysis to code 100 Thai (written in English) and 100 international research articles. From 73 categories, three categories fall into research procedure quality (e.g. validity checks and reliability checks), 15 categories are related to research presentation quality (e.g. level of clarity of research procedure, level of coherence, and 14 categories concern researching quality (e.g. level of strength of justification of instrument, level of consideration of methodological strengths and weaknesses). When looking at whether there is a difference between Thai and international articles for these 32 categories. The findings indicate no difference at all for the research procedure quality. For the research presentation quality, out of 15 categories, 9 show clear differences, while the other 6 reveal not much

difference. For the researching quality, out of 15 categories, 12 show clear differences, and three show not much differences. These 12 categories are 1) level of being informative of literature review, 2) level of reflection in literature review, 3) level of strength of research justification, 4) level of consideration of methodological strengths and weaknesses, 5) level of strength of methodological foundation, 6) level of strength of discussions, 7) level of openness of discussions, 8) level of reflection of discussions, 9) level of appropriacy of implications, 10) level of awareness of decisions, 11) level of strength of claims, and 12) level of strength of justification. Of these three dimensions as manifested in the 32 categories, the categories about the researching quality are the ones which clearly show the biggest different between the two sets of data. By implication, the Thai articles are going to have a lower overall research quality than the articles in international journals.

These two studies suggest that researching quality is an important dimension that cannot be overlooked. It thus needs to be addressed as a major concern for research quality generally.

Conclusion

Since “all research must respond to canons of quality” (Marshall & Rossman, 2006, p. 200), we cannot avoid discussing them, in spite of their philosophical and practical complexity as well as the difficulty in defining what quality actually means or covers. In this paper, we have discussed three dimensions of research quality: research procedure quality, research presentation quality, and researching quality. Through the examples, we have indicated that in producing quality research, research procedure quality and research presentation quality are not sufficient. We suggest that researching quality needs to be taken into consideration when assessing research quality. We, however, do not suggest that these three dimensions are comprehensive. More dimensions may later emerge. Nonetheless, at least at present, to answer Moss et al.’s (2009) question posted in the beginning of this paper, we would say that our touchstones for judging research quality would be these three dimensions.

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bSystems Research Institute, Polish Academy of Sciences, 01-447 Warsaw, Poland; cFaculty of Mathematics and Information Science, Warsaw University of Technology, 00-662 Warsaw, Poland; dSchool of Information Technology, Deakin University, Geelong, VIC 3220, Australia. You are going to email the following Three dimensions of scientific impact. Message Subject (Your Name) has sent you a message from PNAS. Message Body (Your Name) thought you would like to see the PNAS web site. There are three dimensions of knowledge. When properly put together, they will help you conduct more effective research for understanding and solving problems that seem impossibly complex. Those three dimensions are meaning, data, and logic. Many researchers and practitioners are calling for higher quality research for solving complex problems. However, they disagree on how to assess research quality. The most expensive and most time-consuming studies are not always the best quality. We know that research is of higher quality when it is more useful for making decisions to solve complex problems. Research on computational argumentation faces the problem of how to automatically assess the quality of an argument or argumentation. While different quality dimensions have been approached in natural language processing, a common understanding of argumentation quality is still missing. This paper presents the first holistic work on computational argumentation quality in natural language. Following Blair (2012), we distinguish three main quality aspects, each associated with several quality dimensions: Logical quality in terms of the cogency or strength of an argument. Rhetorical quality in terms of the persuasive effect of an argument or argumentation. Through reviewing previous studies related to research quality and guidelines for publishing, as well as looking at research articles published in international journals, this paper reveals research quality from three dimensions: research procedure quality (e.g. establishing validity and reliability), research presentation quality especially concerning the writing up of research (e.g. clarity of research purposes, clarity of findings), and researching quality (e.g. awareness of decisions taken, consideration of methodological strengths and weaknesses). The last of these is a characteristic of research quality that has not been paid much attention previously, and the implications of researching quality for the professional development of researchers are considered.