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Educational Research Literacy: Meanings and Components

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Abstract – *educational research literacy is a specialized literacy that is described as the ability to access, comprehend, and evaluate educational researches and studies, and the ability to plan and conduct research on educational context. With the proliferation of the educational studies, this ability is expected among educators. Nonetheless literature to discuss its meaning and components is limited. This paper proposes the conceptualization of the meaning of educational research literacy and its building blocks. It is argued that educational research literacy is develop around six interrelated components namely: knowledge of research concepts, statistical literacy, information literacy, research engagement, attitudes towards research and critical thinking skill.*

Keywords – educational research literacy, statistical literacy, information literacy, research engagement

Introduction

Education has been perceived to play uncountable roles in society. Education is commonly understood and attributed to formal schooling with designated organizational structure and corresponding administrative and other functions, and structured curriculum to determine subject or course contents to be taught and to guide process of teaching the contents. In the administration of school and in the practice of designing curriculum and the way contents are taught, empirical evidences may be needed, thus educational research results and findings and engaging in educational research is perceived to play significant role.

School stakeholders especially administrators and teachers who play important function in schooling, should have access to various educational research outputs. The 21st century society is characterized as 'information age'. The present technology like the internet, information devices, and the like widen avenues for administrators, teachers and other school stakeholders to conveniently access evidence-based information resulted from empirical educational studies. Results of educational researches are usually published in various journals in the form of research journal articles (Shank, Brown, & Pringle, 2014) and can be easily accessed through journals databases. However, critical evaluation of educational research articles published is needed in order to avoid misinterpretation of the conclusions made about certain educational issue and phenomena.

Apart from being a mere consumer of information from educational researches or studies, educators may plan and conduct educational research on educational phenomena, issues or problems occurring in their respective educational setting. Their involvement in research contributes a lot in their endeavor of educating learners of their respective disciplines, by enhancing their disciplinary knowledge and ability to deliver instruction, understanding of the teaching-learning related problems, and improving their decision making skills. Further, by conducting research, they discover new information and concepts relevant to their field, and acquire empirical evidences of effectiveness of practices in nurturing learners to be expert in their own fields.

Consequently, as added to their existing expected competencies educators should be educational research literate. Information in literature and studies about the concept of educational research literacy is very limited. This

paper aims to contribute to the conceptualization of this concept and to facilitate further discussion about the concept among administrators, educators, researchers, and other professionals.

Theoretical Foundations

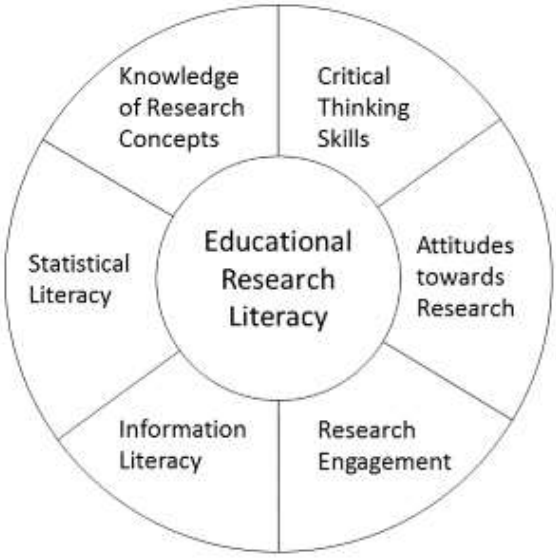
Educational research literacy is perceived to be an emerging form of literacy. Views on the definition of the term "literacy" had evolved overtime that is brought about by social and cultural contexts. The shift in the traditional definition of literacy, as the ability to read, write and understand text, to its broader meaning, which serve as foundation of the emergence of the concept of educational research literacy, is grounded on the sociocultural theory that was proposed by Lev Vygotzky. This theory assumes that individual and his activities and ideas or knowledge are shaped by social and cultural context. New knowledge, ideas, concepts and meanings are derived from the nature of sociocultural context. The concept of literacy, for instance, varies in its meaning as it is perceived from various sociocultural context. The sociocultural perspective of literacy bring forth a shift in its meaning from merely as psychological and cognitive domain towards social and cultural domain. Hence, literacy is not just merely able to read and write text, but it may come in different forms (e.g. information literacy, statistical literacy, computer literacy, etc.) depending on the social and cultural context (Budd & Lloyd, 2015).

Based of sociocultural perspectives, Street (1984) in Pahl & Rowsell (2005) developed models for New Literacy Studies (NLS). These models of Literacy are known as 'autonomous' and 'ideological' models of literacy. Influenced by sociocultural perspective of literacy, Ideological model of literacy stressed that literacy as a social practice that is formed by sociocultural context and is relevant to power. The model emphasized that specific form or type of literacy may emerge by two factors; that is sociocultural context and the power to do. For instance, power to do educational research is educational reseach literacy. Marcum (2002) presented the three levels of the definition of literacy. First level is the ability to read and write, and the second level is the capacity to use other language, codes, and technology. In congruence with the ideological model of literacy, at present, literacy is complex, multi-faceted and social matter, which the third level definition. Literacy as social matter elicits the emergence of various forms of literacies. The term used by Shank et al. (2014) is a "specialized literacies". Research literacy and educational research literacy is an example of specialized literacies.

The progression to the conceptualization of the concept of educational research literacy commences with the unfolding the meaning of research literacy since educational research literacy is a specialized form of research literacy. This succeeding sections explores the meaning of research literacy and educational research literacy, the proposed model of educational research literacy, and implication to research.

Research Literacy

Research literacy is the emerging new form of literacy or specialized literacy brought forth by sociocultural context, and new model and definition of literacy. Literature presented various meaning of the concept. As pointed out by (Shank et al., 2014) research literacy refers to the ability to "develop a complete and comprehensive picture of how research functions" (p. 2). According to Beaudry & Miller (2016), research literacy refers to "the ability to locate, understand, discuss, and evaluate different types of research; to communicate accurately about them; and to use findings for academic and professional purposes" (p. 4). They further claimed that research literacy is the combination of different literacies which includes information/technological literacy, verbal literacy, numeracy, and visual literacy. Research literate individuals should be able to use and access resources like research articles needed for academic research (information literacy), understand written texts and communicate in writing (verbal literacy) which is needed for writing and citing research, understand and apply mathematical calculation and symbols (numeracy) which required to determine statistical tools and analysis for research and



practice, and able to read and use non-verbal text which is required in the presentation of research findings (Beaudry & Miller, 2016).

Further, research literacy may refer to the knowledge of acquiring information for research purposes, by which Besseah, Achiro, Mhando, & Salau (2017) viewed research literacy as knowing how to find information for research, evaluating information and using information in the research process. However**,** Dow & Sutton (2014) claimed that research literacy involves not just being able to search, retrieve, evaluate and use primary and secondary literature, but also the ability to design and conduct research using various approaches (e.g. quantitative, qualitative and mixed methods).

There were efforts made to develop research literacy curriculum in different fields aiming at inculcating this literacy among learners. Likewise, research literacy curriculum proposed by Dow & Sutton (2014) involved four phases. The first phase is the bodies of knowledge; the second phase is evidenced-based practice; third phase is customization of resources; and final phase is organizing information. This was organized corresponding to the three processes involved in the development of research literacy which are: collecting, analyzing and communicating data.

Educational Research Literacy

Educational research is a type of research conducted in the field of education. As presented earlier, the ability to comprehend and evaluate research is referred to as research literacy, thus educational research literacy as a specialized form of research literacy refers to ability to comprehend and evaluate educational research. Groß Ophoff, Wolf, Schladitz, & Wirtz (2017) defined educational research literacy as "the ability to purposefully access, comprehend, and reflect scientific information as well as apply the resulting conclusions to problems with respect to educational decisions" (p. 39). To be [educational] research literate, according to Shank et al.(2014), educators should know "The basic principles of qualitative and quantitative research in education; how research articles are put together; how to read research articles at increasingly more complex levels; how to evaluate the quality of the research" (p. 2).

The study of Groß Ophoff, et al. (2017) was among the few studies conducted along this topic. In the study, three factors were identified that build up educational research literacy, namely: information literacy, statistical literacy and evidenced-based reasoning.

Educational Research Literacy Model

This paper focuses itself on the concept of educational research literacy as the ability to access, understand, and evaluate educational research and its outputs, and as the ability to plan and carry out educational research. Further, educational research literate individuals act as effective "consumer" and "producer" of educational research.

This paper proposes a model, summarized in figure 1, to better conceptualize components of educational research literacy. The conceptualization of the model is based on the ideas in literature cited above about research literacy and educational research literacy. The model presented six components of educational research literacy. These components should not be viewed as separate or isolated entities, but interrelated to one another. These components altogether make up educational research literate individual. It is proposed, educational research literacy involves the following interrelated components: knowledge of research concepts;

statistical literacy; information literacy; research engagement; attitudes towards research and critical thinking skill. The succeeding subsections discuss each component.

Knowledge of Research Concepts. Basically to be able to comprehend and evaluate, as well as conduct educational research, knowledge of research concepts is necessitated. It is the basic characteristic of educational research literate individual. As mentioned in earlier sections, Shank, et al. (2014) stressed that [educational] research literate professional needs to possess basic knowledge of concepts and principles of research – qualitative and qunatitative research.

The term "research" may mean several things as it is relative to the contexts or situations. One thing in common is that research involves gathering of information. However, it is important to note that doing research is not merely searching for information to provide description. It involves providing explanation, developing theory, predicting future events,

Figure 1: A Model of Educational Research Literacy

generalizing findings, contributing additional information to the existing literatures, and validating previous researches (Oliver, 2010). Further, Calmorin (1994) define research as "scientific investigation of phenomena which includes the collection, presentation, analysis and interpretation of facts that link man's speculation of reality" (p. 1).

Table 1
Five Elements of Knowledge of Research Concepts

1.	Familiarity of educational research questions and it formulation
2.	Awareness of the theoretical conceptual framework in educational research
3.	Understanding of educational research designs
4.	Understanding of methods of data gathering and analysis.
5.	Knowing how to interpret results
6.	Knowing how to develop conclusions

Research undertaken in the field of education is termed as "educational research". Educational research refers to a systematic way of gaining understanding of the educational process, generally with a view in improving its efficiency. It also refers to application of scientific method to the investigate educational problems. Educational research, as a process, involves the following steps: to frame initial question or problem; review previous research about the question or problem; formulate specific research question; problem or hypothesis; collecting and obtaining data; analyze and interpret the results of gathered data; and finally develop conclusions (McMillan & Wergin, 1998).

Knowledge of research concepts for this purpose is referred to basic understanding of the basic concepts of educational research. It involves basic knowledge of the educational research process. It is conceptualized to consist of six elements, as presented in table 1. These elements are required in the various activities in the educational research process.

Statistical Literacy. Educational studies, especially quantitative studies involves data analysis and interpretations to generate findings about the phenomena or issues under study. The results may be presented in various forms (e.g. table, graphs). Inferences and conclusions in educational studies is grounded on certain statistical analysis and interpretations, in fact statistics is the main tool to analyze and interpret the research data. Educational research literate individual should possess basic understanding of statistical concepts and be able to evaluate information or claims involving statistics. With this, statistical literacy is argued as significant component of educational research literacy. Authorities (Gal, 2002; Garfield, delMas & Zieffler, 2010; Watson & Callingham, 2003) exert efforts of clarifying the concept of statistical literarcy. Gal (2002, p. 2-3) defined statistical literacy as follows:

> statistical literacy refers broadly to two interrelated components,

> primarily (a) people's ability to *interpret and critically evaluate* statistical information, data-related arguments, or stochastic phenomena, . . . and when relevant (b) their ability to *discuss or communicate* their reactions to such statistical information.

Gal (2002) developed a model of statistical literacy in which it has two elements: knowledge and disposition elements. Knowledge element is comprised of literacy skills, statistical knowledge, mathematical knowledge, context knowledge, and critical questions, and disposition element is comprised of critical stance, and beliefs and attitudes. He stressed that statistical literate individual should possess these elements.

Garfield, delMas & Zieffler (2010) in Sharma (2017) defined statistical literacy as understanding and using basic language and tools of statistics (e.g. understanding meaning of basic statistical terms, using simple statistical symbols and interpreting different representations of data).

Watson & Callingham (2003) also presented a model of statistical literacy which is a hierarchical construct comprising of six level; namely: ideosyncratic, informal, inconsistent, consistent non-critical, critical, and critical mathematical. Level 1 as idiosyncratic level is characterized by engagement with context, tautological use of terminology, and basic mathematical skills associated with one-to-one counting and reading cell values in tables. Level 2 as informal level is described as colloquial or informal engagement with context often reflecting intuitive non-statistical beliefs, single elements of complex terminology and settings, and basic one-step straightforward table, graph, and chance calculation. Level 3 as inconsistent level is often in supportive formats, expect selective engagement with context, appropriate recognition of conclusions but without justification, and qualitative rather than quantitative use of statistical ideas. Level 4 as consistent non-critical level is characterized by appropriate but non-critical engagement with context, multiple aspects of terminology usage, appreciation of variation in change setting only, and statistical skills associated with the mean, simple probabilities, and graph characteristics. Level 5 as critical level require critical, questioning engagement in familiar and unfamiliar contexts that do not involve proportional reasoning, but which do involve appropriate use of terminology, qualitative interpretation of chance, and appreciation of variation. Level 6 as critical mathematical level demand critical, questioning engagement with context, using proportional reasoning particularly in media or chance contexts, showing appreciation of the need for uncertainty in making predictions, and interpreting subtle aspects of language.

Information Literacy. Practically saying, individual undoubtedly cannot comprehend and evaluate on something if he/she has no access to it. Likewise, individual cannot comprehend and evaluate educational research if he/she has no access to various information of educational research outputs that is are usually in the form of research journal articles (Shanks, et al, 2014). Further, it was stressed that research literacy involves the ability to locate and access information (Beaudry & Miller, 2016). The ability to determine when information is needed, and ability to effectively locate, evaluate, and use information is referred to as information literacy (ALA, 2018). Thus, it is claimed that information literacy is considered as comprising component of educational research literacy.

One of the competencies of an information literate individual is understanding clearly the nature and extent of the needed information (Exner, 2014). She articulated the performance indicators of the competency, such as: defines and articulates the need for information, identifies a variety of types and formats of potential sources for information, considers the costs and benefits of acquiring the needed information, and reevaluates the nature and extent of the information need.

Research Engagement. This paper portrayed educational research literacy as ability

needed to be "producer" of educational research apart from being mere "consumer" of information from educational research. As emphasized earlier, [educational] research literacy involves ability to design and conduct [educational] research (Dow & Sutton, 2014), thus educational research literate professionals has to engage is research. Research engagement is considered as the academic activity of educational research literate professional.

Nelson, Mehta, Sharples, & Davey (2017) stressed that research engagement involves activities like "the use and application of academic/professional research, as well as schools undertaking their own research and enquiry activities" (p. 5). Creaby, et al. (2017, p.2) decribes two forms of research engagement which they stated as follows:

> "Two main forms of research engagement are distinguished in studies of the subject: responding to public research ('engagement with') and doing one's own research (engagement 'in'). The former involves getting access to, and making sense of, publicly available evidence. The latter means participating in some form of enquiry linked to one's own practice".

There were studies (e.g. Nelson, et al., 2017; Finch, et al., 2013) conducted to investigate the factors influencing of research engagement. Finch, et al (2013) found out that research engagement is predicted by qualification obtained, current position classification level and overall interest in research. Furhter, using factor analysis Nelson, et al. (2017) identified the constructs of research engagement, namely: Positive disposition to academic research in informing teaching practice; Use of academic research to inform selection of teaching approaches; Perception that academic research is not useful to teaching (reverse scoring); Perception that own school does not encourage use of academic research(reverse scoring); and Active engagement with online evidence platforms.

Attitudes towards Research. How individual participate in certain undertaking, is influenced by his beliefs and attitude towards this. Without inclination towards understanding and doing educational research, individual is not motivated and may impossibly develop this ability. Attitudes towards research is argued as significant contributing component to the development of educational research literacy.

What builds up attitude towards research has been the subject of various studies (e.g. ÇELİK, GAZIOĞLU, & PESEN, 2012; Papanastasiou, 2005; Shaukat, Siddiquah, Abiodullah, & Ali Akbar, 2014). In the study of ÇELİK, et al. (2012) conducted a study to develop Scale of Attitudes toward Research (SAR). They found out that attitude towards research is built around five factors namely: interest, significance, motivation, efficacy, and concern. Papanastasiou (2005) also conducted a study to explore the influencing factors of attitudes towards research. Usefulness of research, research anxiety, positive attitudes toward research, relevancy to the student's nonacademic and non-professional lives, and difficulty of research are the five explored factors.

In the study of Shaukat, et al. (2014) in which they made used of the instrument developed by Papanastasiou (2005), Participants with higher educational attainment have higher perceptions along research usefulness, positive attitudes towards research and perceived relevance of the research to the life.

Attitudes towards research as mentioned earlier influence interest in doing educational research. While interest in research influence research productivity. Kahn & Scott (1997) found out that interest in research predicts research productivity and career goals (e.g. educational research literate professional).

Critical Thinking Skill. This paper conceives educational research literacy as the ability to evaluate educational research. As stressed by Shank et al.(2014), an educational research literate individuals should know "how to evaluate the quality of the research" (p. 2). The ability to critically examine and understand published research in one's professional area of interest is an important component of critical

thinking skills (Wallmann & Hoover, 2012). Hence, it is proposed that critical thinking skill as one of the component of educational research literacy.

Critical thinking refers to purposefully and reflectively judge on the belief and action as response to the observation, experience, verbal or written expressions or arguments (Adeyemi, 2012). Educational research literate individuals reflect on the information from educational studies and make value judgements on appropriateness of the conclusions made as well as the process of arriving into such conclusions. Further, they gather information to justify their judgement on the conclusions, and it is an attribute of critical thinking individual. In consonance with this idea, KARAKOÇ (2016) describe critical thinking individuals as people who evaluate the information by elaborating true basis, being open-minded and aware of thinking processes.

Implication to Research

It is acknowledged that the proposed ideas on educational research literacy presented earlier may lack solidity. Although, it is recognized in this paper the importance of educational research literacy and its proposed components, further researches along this topic are needed to translate the ideas raised in this paper into action (e.g. the development of curriculum to develop educational research literacy, continuing professional development program addressing this ability). Further, research on educational research literacy is needed to substantiate the speculative ideas presented in this paper, and qualitative investigation is highly recommended to provide in-depth understanding of the concept.

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