Development Research: Principles, Methods and Challenges

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Abstract

Development research has acquired increased significance in the present day world due to variety of reasons, including developments in the area of education and technology. Educationalists and academicians have provided several ways in which development research can be defined. However, the conceptual framework of development research that is widely accepted lies in this definition: "the systematic study of designing, developing, and evaluating instructional programs and processes that must meet criteria of internal consistency". Here, it is pertinent to note that this definition also envisages that in addition to internal consistency, the aspect of 'effectiveness' should also be ensured. It has been found that the practice of developmental research gains increased significance on various fronts of the universities (including higher education system), particularly in the field of instructional technology). Large volume of development research studies are carried out, across the regions of the globe, every year on subject areas that are directly relevant to policy and practice in international development, including sustainability in educational technology. This research paper primarily aims to discuss the role of research in relation to: (a) "educational design", and (b) "development activities". It also outlines motives for developmental research. This paper is structured in a way where the introductory part is outlined in the first section, the second section of the paper covers the application of the development research, the methods which are used for this research and the findings. To sum up, development research, as a relatively new and upcoming research approach, has its potentials and limitations. It has few challenges for those who are interested in further exploration and improvement of its methodology. A challenging trend for designers, for instance, is the "increasing prominence of prototyping approaches". The paper concludes by giving future recommendations for the field.

Keywords

Development Research, Policy, Practice, International Development, Principles, Educational Design, Methods, Challenges.

1. Introduction and Rationale

Researchers argue that data enables in solving development challenges through multiple channels. It forms the foundation of the research that informs the decisions of policy makers and development practitioners for moving towards viable solutions. Also, data can serve as a spur to policy reform efforts by providing benchmarks and examples of best practices in the developmental initiatives. Analysis of data obtained from development research model is applicable in designing & implementing developmental initiatives for a variety of purposes, across the regions of the globe. For instance, it may provide the researchers (including policy makers) with an opportunity to explore an issue of current relevance for the purpose of designing and implementing a programme. Further, what is of increased significance in this context is that it (development research), in a broader sense, familiarizes researchers about an area that is connected with their own needs. Also, it may attempt to collect in-depth information (data) about a specific issue in

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order to make a case for change. It has been observed that development research methods are also used in programme monitoring (including evaluation) and review purposes in varying contexts. These types of review and evaluation studies include (a) impact evaluation studies; (b) knowledge, attitude and perception (KAP) studies, and (c) mid-term project review studies. Research studies of this type can range from very small local pieces of work (perhaps just reviewing existing information) to major international projects. Development research, in more specific terms, envisages collecting new and desired information in a more scientific way, while exploring challenges that needs to be addressed. It is in this context that the present policy paper has been authored.

2. Objectives and Methodology

In terms of relevance and practical applicability, while developmental research is only one of several types of research methods that can provide practitioners with usable data, its emphasis on the design, development, and evaluation of instructional products and processes is unique in the hands of researchers and policy makers. Despite the fact that research in relation to design and development issues is being more increasingly recognized in various sub-domains of education in many countries, not much effort has yet been made to articulate (and disseminate) its major principles and methods in the field of education (and educational technology). The overall objective of this paper to contribute to the discussion on modality needed to design and implement development research methods and principles. In terms of specific objectives, this research note primarily aims to investigate into the contribution and role of development research in varying contexts. The discussion presented in this work by the author centres around two important aspects. These aspects are in relation to: (a) "educational design", and (b) "development activities". Also, this paper:

• Attempts to emphasize the rationale and basic principles of development research by:

a) Outlining motives for conducting formative research

b) Analysing definitions and aims of various types of development research, and

c) Discussing several of its key characteristics; and

• Aims to investigate into methods of development research by way of,

a) Exploring some of its typical problems and dilemmas, and

b) Discussing several associated challenges for further action and reflection.

In terms of methodology employed in this research work, secondary data has been used (sources are quoted in the reference section) by the author. Secondary dates used are largely 'qualitative' in nature. Method of data analysis is descriptive, involving "desk-based research".

3. Significance of Development Research

There are various motivating and contributory factors for initiating and conducting development research that are undertaken by policy makers and other stakeholders. It has been found that "traditional research approaches" (for instance, experimental research, survey studies, evaluative studies, and correlation analyses) place more focus on "descriptive knowledge". Such approaches do not provide much description on useful solutions for a variety of design and development problems in the field of education.

One of the greatest and more pressing challenges for development research designers is: how to cope with the manifold uncertainties in their complex tasks in very dynamic contexts. In case, researchers opt to seek support from other stakeholders in order to reduce those uncertainties, the outcomes are not very encouraging (in practical terms). In most cases, answers are too narrow to be much meaningful. It has been observed that answers derived are too superficial to be instrumental. Also, they (derived meanings) are too artificial to be relevant. Most importantly, by the time answers (to the intended or desired questions) come, it is too late and

because of this, they are of no use. Development planners (including development researchers) are found to attempt to prefer more adequate information in order to create a solid and more scientific ground for their choices. Also, they are likely to opt for a research mechanism that ensures more timely feedback. This strategy, in turn, ensures relevant and timely improvements in the developmental initiatives. In addition to this, the professional community of research developers and other stakeholders would be helped by a growing body of knowledge that is based on empirically tested design principles and methods (Akker, 1999).

In addition to the description presented above, another reason for increasing significance being attached to development research is quite complex nature of many reform policies in education that are taking place from time-to-time, across the regions of the globe, in order to meet ever changing needs. These reform policies affect many system components. Again, they (reform policies) are unique due to following two reasons:

a) they are multi-layered (including both large-scale policies, and small-scale realization); and

b) they are very comprehensive (in terms of "factors-included" and "people-involved").

In addition to what is stated above, it is worth mentioning here that there are four significant characteristics of the context and the framework within which development research is undertaken. First, scope of diverse needs is often very wide. Second, the problems to be addressed are usually not clearly specified (or ill-specified). Third, in most cases, the effectiveness of proposed interventions is (mostly unknown) beforehand, thereby hindering goal achievement. Fourthly, it has been found that the eventual success is highly dependent on implementation processes in a broad variety of contexts (Akker,1999).

It is in the context presented above that, it has been realized that reform policies and initiatives would be benefitted, in academic and research terms, from a model that is more interactive and cyclic,

and that envisages spiral approaches. Model of this type would take into account "integrated research activities" in order to feed the process: both forward and backward. Such an approach (or model) forms part of development research. This approach (of development research) has potential to provide more opportunities for (a) "successive approximation" of the ideals (in particular), and (b) for more "strategic learning" (in general). Review of past research experiences are indicative of the fact that those endeavours that attempt to exploring the potential of information and communication technologies in education, are very much in need of research studies in various disciplines of social science subjects. They help overcome inherent complexities that hinder achieving developmental goals. Despite all these potentialities and advantages associated with development research, the author of this work specifically makes a point here that policy planners and development administrators do not attach much significance to such development research initiatives, especially when compared to investments in other developmental initiatives (Akker, 1999).

4.   Principles of Development Research

While results from research based on other approaches influence the development process in several ways, the study of variables embedded in such topics does not, in true sense, constitute developmental research. Design & development, for instance, is dependent on what is already known about the learning process. The academic community has learnt from the research literature that transfer of training is influenced and impacted, to varying degree, by three indicators or factors. They are:

a)   Motivation,

b)   Organizational climate, and

c)   Previous educational experiences

The international research community may, therefore, look forward to adopt and expand a front-end analysis in order to address such issues. They may also institutionalise construct design

models that reflect this information. From more scientific point of view, the foundational research, however, would not be considered developmental. The fact remains is that if the new models were tested, or programmes evaluated that were designed using such models, this research would be qualified as developmental research. It is in this context, that distinction should be made between reports that analyse actual development projects, and descriptions of recommended design and development procedural models. Despite the fact that these models may represent a synthesis of the research, they do not constitute research in themselves (The Association for Educational Communications and Technology, 2001).

5. Application of Development Research in Different Sub-Domains

There are areas pertaining to education (and technology) where development research is practiced description on how development research applies in different sub-domains of education is presented below:

(a) Curriculum: In the context of methodological issues in curriculum research, formative research gains increased significance. One of the major goal of this type of development research is to inform the decision making process during the development of a programme. This type of arrangement facilitates improving the programmes being developed in varying contexts. In such situations, the emphasis is placed on the supportive role of research for development (Walker, 1992).

(b) Learning And Instruction: Arguments for institutionalising development research models in the broad sub-domain of learning and instruction are being increasingly made the world over. This type of research effort (or study) highlights the kind of research that includes two aspects. They are (a) developmental work in designing learning environments, and (b) formulating curricula. It also places increased significance on efforts aimed at contributing to fundamental scientific understanding. It is argued

that researchers should not only concentrate on the question of whether a theory results in accurate predictions, but also ask whether it works in practical terms (Flagg, 1990 and Collins, 1992).

(c) Teacher Education: Another sub-domain where development research is well-established and operationalised is teacher education. At this juncture, it is pertinent to note that the broad domain of teacher education encompasses both (1) "pre- and in-service education", as well as (2) the broader phenomenon of "professional development". It has been found that, in field of teacher education, the conceptual framework of "action research" has gained increased relevance. This type of research initiative involves practical inquiries wherein teachers (often in collaboration with others) make scientific attempt to investigate and reflect on their own teaching, including learning of students. The primary goal of development research, in the context of teacher education is to make contribution towards the professional learning of the teachers. Most importantly, the goal (or objective) of this type of development research initiative is also to bring about changes (sometimes "desired changes") in a specific educational setting (Gravemeijer, 1994).

6. Quick Look at Typology of Development Research

In efforts aimed at designing structure of (and for) various types of development research, it becomes difficult to include action research studies within this framework. This is because of two considerations. Firstly, because it (action research) is a term that has changes connotations over the last years (decades) in various contexts and settings. The second aspect is that action research, in practice, often refers to ongoing activities and projects that almost exclusively convey the "action component" of research. It is because of these considerations that it lacks an explicit scholarly orientation on contributions to the body of knowledge that is accessible (and available) to other researchers (or development stakeholders). In a broader sense, an approach that is to be

included under the category of development research must have potential to make more balance between what are known as: 'development', and 'research' (Hollingsworth, 1997).

The academic and research community also argues that another way to differentiate between various types of development research is to focus more on the temporal relation between design and development activities, on one hand, and the research activities, on the other. The pertinent question that needs answer in this context is: "is the research study concentrated in the stages before, during, or after the bulk of design and development activities"? Its answer lies in the fact that in most of the cases, research initiatives aim to focus on the type activities that occur either before actual design or throughout the entire development work. This is done for two reasons: (a) to offer suggestions for improvement, and (b) to test design principles. The author makes a specific point here that in these processes, the linkages between those who conduct the design and development activities and those who perform the research are usually strong (Akker, 1999).

In terms of typology of development research, there is another approach wherein there are two categories: (a) "type-I" approach, and (b) "type-II" approach. Type-I refers to an approach wherein the roles of a research designer partly coincide within a specific development context. This type of research (type-I) usually occurs throughout the complete development cycle. In type-II development, on the other hand, that relationship (between research designer and specific development contexts) is comparatively loose in the sense that the researchers are not involved in the research design and development process themselves. Rather, they strive to study those processes (including tools and models applied) as practiced by others. This is done with the objective of drawing inferences and conclusions concerning design principles of generalizable nature. In type-II approach, the emphasis is placed on timing of

those reconstructive activities during, but especially after design and development practices (Richey and Nelson, 1996).

In addition to above categories of development research, there is another labelling of the various approaches. It is outlined below:

6.1 Explorative Design Studies: This type of development research (preceding the actual development work) aims at achieving two objectives. They are (1) clarifying the design problem-in-context, and (2) generating tentative design ideas. It should be noted that such explorations (or explorative design studies) can be quite informative in directing the development work. The research designers, however, should not include these studies under the heading of "scientific research". This is because of the fact that they do not aim at making statements of a more or less generalizable nature (Akker, 1999).

6.2 Formative Research: Formative research is indicative of research activities that are performed during the entire development process of a specific intervention. The intervention period ranges from "exploratory studies" through "evaluation studies". These types of research projects are aimed at optimization of the quality of the intervention, on the one hand, and testing design principles, on the other (Akker, 1999).

6.3 Reconstructive Studies: Reconstructive studies refer to research activities that are conducted sometimes during (but often times after) the development process of several interventions. Such research initiatives generally aim to focus on the articulation and specification of design principles. This typology of development research offers a useful starting point for more detailed and nuanced discussions on characteristics and methods (Akker, 1999).

7. Methods of Development Research

The author of this paper makes a specific point here that methods of development research are not necessarily different from those that are used in other research approaches. There are, however, some specific features that can be found to be

prevailing in the context of development research. There are two features. The first feature is connected with the central role of formative evaluation procedures in formative research. Second aspect is found to refer to several typical methodological problems for development researchers. Description of these two aspects is presented below:

7.1 Formative Evaluation

It has been found that formative evaluation occupies a prominent place in development research (especially in formative research). The underlying reason behind this central role is that formative evaluation provides the type of data (information) that feeds the cyclic learning process of developers during the subsequent loops of a design (and development). This type of development research is useful in situations when (a) fully integrated in a cycle of analysis, design, evaluation, and revision; and (b) contributing to improvement of the intervention. Description on characteristics of formative evaluation within the context of development research approaches is elaborated below:

(a) Priority on Information Richness and Efficiency: It is suggested that formative evaluation within development research should not only concentrate on locating shortcomings of the intervention in its current (or draft) format. Rather, it should especially generate suggestions on how to improve those weak points. Richness of data (information) is found to be more productive than standardization of methods to collect data (and analyse them in logical order). Again, efficiency of procedures is something which is crucial. This aspect (including richness and authenticity of data) requires special attention. It should be noted that "the lower is the costs in time and energy for data collection, processing, analysis and communication; the bigger is the chances on actual use and impact on the development process". In this context, the researchers must take note of the fact that sample size of respondents for data collection, for instance, will be relatively small and purposive,

when compared to sampling procedures for other research purposes (Akker, 1999).

(b) Shifting Emphasis in Quality Criteria: The major contribution of formative evaluation is furthering quality improvement of the intervention under development (or study). In this context, the term 'quality', however, is an abstract concept that requires specification. It has been found that during development processes, the emphasis in criteria for quality shifts from 'validity', to "practicality and effectiveness". The term 'validity' here refers to the extent (a) that the design of the intervention is based on state-of-the-art knowledge ("content validity"), and (b) that the various components of the intervention are consistently linked to each other ("construct validity"). The term 'practicality', on the other hand, refers to the extent that users (and other experts) consider the intervention as appealing and usable in normal conditions. Again, the term 'effectiveness' indicates to the extent that the experiences and outcomes with the intervention are consistent with the intended aims (Akker, 1999).

7.2 Methodological Issues

In this context, the pertinent question needing answer is: "what are some typical problems and dilemmas faced by researchers engaging in development research"? An attempt has been made in the following section to briefly explore some of them, notably as often experienced in formative research (where the combination of practical and scientific aims is most prominent). discussion follows below:

(a) Division Between Development and Research: An area of concern in formative research is the tension (or rather differences of opinions) in the division of roles between developers and researchers. This problem can, however, be minimized while working in bigger teams in which some role variation is possible. Nevertheless, the author of this paper makes specific point here that a problem can easily arise between 'designers' who are eager to pursue their ideals in creating innovative interventions, on the

one hand, and 'researchers' who aims to critically seek for correctness of decisions and empirical proof of outcomes, on the other hand. Despite these facts, here, it is pertinent to note that controversy between "subjective and imaginative involvement" and "objective and critical distance" is not necessarily negative. In fact, this aspect should be treated as a productive force. Such a productive force or contributory factor facilitates arriving at "balanced solutions" in the field of education and development, including information technology (Akker, 1999).

(b) Differentiating "Critical Variables" and "Comprehensive and Complex Design": Difference between formative research and many types of research is that one can hardly isolate and measure separate variables in the same study. As against this, in formative research, the increased emphasis is placed on investigating comprehensive interventions that deal with many interrelated elements at the same time. This particular situation makes it difficult to apply experimental approaches. However, despite this limitations, it should not be of much concern to formative researchers. The aim of formative research, on the other hand, is different in the sense that it requires more comprehensive and flexible approaches that offer less strict methodological precision. This approach provides adequate answers to design problems. Further, it is important to note that experimental approaches are not entirely impossible to implement in the context of development research. Furthermore, if the design aims towards instructional interventions, summative evaluation via experimental methods may be appropriate in many settings and contexts (Akker, 1999).

Generalization of Findings: It has been found that data collection in formative research normally envisages small (and purposive) samples. It is due to this consideration that efforts to generalize findings cannot be based much on those statistical techniques which focus on generalizations from sample to population. The fact, therefore, remains is that the researchers have to invest monetary and non-monetary resources in "analytical forms of generalization". Also, the readers (of development research reports) need to be additionally supported in order to enable them to make their own attempts to explore the potential transfer of the findings to theoretical propositions in relation to their own context. It has been observed that reports on formative research can facilitate the task of analogy reasoning in two ways: (a) by a clear theoretical articulation of the design principles applied, and (b) by a careful description of both the evaluation procedures and the implementation context (Miles and Huberman, 1994 & Yin, 1994). Another option that may stimulate exploration of possibilities for generalization is to organize interactive meetings with experts from related contexts to discuss the plausibility of the research findings and recommendations for related tasks and contexts (Akker, 1999).

8. Challenges for Development Research

Development research, as a relatively new and upcoming research approach, has its potentials and limitations. More specially, it has challenges for those researchers (including other development stakeholders) who are interested in further exploration and improvement of its methodology. A challenging trend for research designers, for instance, is the increasing prominence of prototyping approaches (Akker, 1999). Various questions in this context, thus, arises. The pertinent questions are:

What does (rapid/evolutionary) prototyping imply for efficiency of the development process?

Will it affect the balance between creative and systematic features of the approach?

Does it reduce the relevance of preliminary investigations?

To what extent does it influence the relationship between methodology (as prescribed in literature) and actual design activities in professional practices (can 'theory' keep up with

'practice', or will the gap even widen)?

o   In relation to this trend, will the many emerging technological tools and environments for learning, communication, designing and performance support strongly change development approaches and outcomes?

o   Will they reduce the distance between design, delivery, and utilization of educational interventions?

Many challenges are also apparent with respect to evaluation methodology. (Akker, 1999). Some of the prominent challenges are:

a)   What are appropriate tactics for increasing the information richness and efficiency of data collection procedures and instruments?

b)   How may the linkages between data collection, processing, and analysis be optimized?

c)   How can the communication about evaluation findings and the subsequent utilization for improvement of interventions be furthur utilised?

d)   What are the most relevant indicators of quality, success and impact of interventions?

e)   What are promising approaches to further the generalizability of research findings?

f)   How can the utilization of evaluation findings to design tasks in other settings be facilitated?

9.   Summing Up

An overall reflection is that, research-based progress to expand and sharpen knowledge on design and development is greatly enhanced through interdisciplinary approaches with purposive cross-fertilization between the many specialized sub-domains in educational science and technology. Moreover, it has been discovered, through research findings, that joint development research initiatives of professionals in various roles offer fine opportunities for professional learning and capacity building. Such activities have the potential to sometimes produce outcomes with 'interlocutor' significance: results that "hit someone between the eyes" (Akker, 1999).

The paper concludes that, development research, as a relatively new and upcoming research approach, has its potentials and limitations. It has few challenges for those who are interested in further exploration and improvement of its methodology. A challenging trend for designers, for instance, is the increasing prominence of prototyping approaches.

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