# META-ANALYSIS: A BOOSTER TO SOCIAL SCIENCE RESEARCH

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**Abstract**

*Ample of researches has been done in the field of education even after the less requirement of further research however they are in need of organisation of existing researches. Meta-Analysis is the methodological and statistical approach to systematically & logically arrangement of the abundant of empirical studies and synthesizing results to draw conclusions from findings. Using the meta-analysis, researchers may be able to respond to two serious problems: easy integration of studies dealing with the same problem in order to respond to it precisely and the mutual comparison of different studies. This paper is an attempt to aware about the basic concepts involved in meta-analysis, goals to achieve, need to execute meta-analysis, myths and realities attached to meta-analysis following by the criticism of it. This will give guidelines to the researcher for keeping in mind the questions which he/she wants to explore through meta-analysis, knowledge about the selection of the studies and what kind of answers the researcher would be able to get after performing meta-analysis.*

***Keywords:*** *meta-analysis, empirical studies, synthesizing, systematically & logically, methodological and statistical.*

## Introduction

Most of the research actions in the field of education are mainly represented by two things: a large volume and intense collection of empirical data. At the same time it can be observed that the research methodologies and pedagogies which are being used for these empirical researches are almost as same as the representation of data in the studies. There are few areas which do not need any further research but it is still continue and the results found in researches are just the replica of old studies. At the same time many new methodologies, pedagogies experiments, action researches and a variety of complex statistical analyses are introduces in the field of education to craft a variety of knowledge. There are numerous of studies done in each area of education which are need to be combine and synthesise to produce unanimous results and to know overall achievements or drawbacks in that particular field so that the application of education policies can produce best outcomes in the field. However, it doesn't observe mere synthesis of previous knowledge, but an informative overview of what has been done in recent times in the research area of education and where is still

need to be focused. Researchers in the field of education and of course, all pedagogical workers who use the results of research work have long been aware of this situation and they are well trying to produce best outcomes for contribute in education. Scholars in their own restricted field of specialization are even managing to keep pace with this swift progress and putting their hands in this new area of knowledge and experimenting to come up with the application of latest technologies of comprising old results to produce common generalisations. To comprise results from voluminous literature, it is need to organize those studies in well manner and it is very obvious that it needs a special pedagogy & methodology to organize these studies to avoid wastage of time and energy.

Therefore keeping all things in mind the 'Meta-Analysis' was introduce to get better organization of numerous literatures containing a variety of different methodologies, questionnaires, samples, variables, years of the studies, demographic variables, tool used in the studies, studies containing synonyms of the variable under observation, sources of the studies etc. Meta-analysis is an extremely valuable method, especially useful in educational research because it allows us to draw conclusions and generalizations from a variety of patterns and situations. The term Meta-Analysis was first coined by G.V.Glass in 1976. Initially it was discovered for the application in social science research but later it was best used in medical researches and produce tremendous development and remarkable results. At present the educationists in social sciences are applying this methodology in the area of education and breaking the taboos in educational researches.

## Essentials of Meta-Analysis

For the researches in social sciences there is need of various kind of analysis on data which is sometimes known as primary analysis or secondary analysis. The term 'primary analysis' refers to the typical thinking of as data analysis, when a researcher collects data from individual persons, companies etc. and then analyse that data to give answers to the research questions that motivated the study. On the other hand the term 'secondary analysis' refers to re-analysis of already present primary data, often to answer different research questions or to answer research questions in a different way due to having diverse opinions. This secondary data analyses can be performed either by the original researchers or by others if they are able to acquire the raw data from the first researchers. Both primary and secondary data analysis necessitate access to the full raw data as collected in the study. In contrast to above explanation, meta-analysis contains the statistical analysis of the results from minimum two to as many as the experimenter or the researcher wants. In meta-analyses the sample or the unit of analyses is not any human or any company but the each study which is under observation. It involves the results of sample studies especially in the form of effect sizes and extracting these effect sizes do not need any access to the raw data of any study

because it is possible to calculate effect sizes from the data as it is presented in studies calculated from primary or secondary analyses. Therefore it is defined as the statistical analysis of a collection of results from individual studies for the purpose of generalisation and come forward with more reliable and trustworthy conclusions than the individual studies, taken under observation.

## Need to Perform Meta-Analysis

Meta-analyses are conducted for a variety of reasons, not only to synthesize evidences but the purpose of the meta-analysis more generally is to analyse the purpose of any research and implications for when it should be performed, what model should be used to analyse the data, what sensitive issue should be undertaken and how the results should be interpreted. It should always be kept in mind while performing Meta-Analyses that it is a tool with multiple applications causes' confusion and sometimes leads to pointless discussions about what is the right way to perform a research synthesis, when there is no single right way. Therefore the thought process on the part of researcher requires to capture the finding reported in each study, to assign an appropriate weight to that finding and then to generalise these findings across all studies in the process. Effect sizes calculated determine the space of each study in the meta-analyses research, particularly the study contains largest space among other studies is known as 'Donat' and the study contains smallest part among all is known as 'Peck'. Using Fixed-effect model of meta-analyses determines 'Donat' five times as much weight as Peck and in Random-effect model it is 1.8 times respectively depends upon the selection of studies made by the researcher.

## Goals in Meta-Analyses

Meta-Analysis is not just to synthesize data from a set of matching studies but the goal of it to expand the base of the studies and examine the contribution of each research. It observes the pattern of answers from all identical studies during a period of time. These answers from the studies under observation must be taken in the context of specific goals of meta-analysis. It is basically depend upon the question of matching the synthesis to the research question. If the goal in research questions is to report a summary effect then only the populations and interventions should be matched, of the studies taken as sample units, moreover if the goal is to report on the dispersion as well as the mean effects as a function of a covariate, then the synthesis must include the relevant studies and the analysis should focus on the differences in effects. The other goal in meta-analysis is to include the sufficient number of studies in the meta-analyses process because a serious problem exists when the synthesis is based on very small number of studies. If there is lack in sufficient number of studies, there would be problem of estimating 'between-studies variance' and this keeps an important implications for many aspects of analysis.

## Myths and Reality about Meta-Analyses

Many people take Meta-Analysis as a new approach in the field of social sciences but it is as old as the other methodologies or pedagogies in education or other social science areas. Meta-Analyses were already being introduced in the seventeenth century but the actual term was introduced in 1976 by G.V. Glass to synthesise the results of various studies done in the field of education but it was wildly used in medical field to analyses the results of different medicines and to diagnose the reasons of various illnesses. Presently this methodology of research is emerging fast among young researchers, knowing the need of combining results of already presented researches and to come up with the applications in the practical field of education. Today, there are few myths about meta-analyses due to lack of proper knowledge and may also because of the confusing behaviour of meta-analyses. The myths and reality about meta-analyses is described as under:

- It is a common misconception regarding meta-analyses that one can draw anything by performing meta-analysis and come up with good results; however larger sample collection in meta-analysis than a single research study, can be taken as possible strength in approaching data to draw the best conclusions but it does not mean that even after planting Azadirachta indica (Neem) one can get a mangoes out of it. Therefore selection of good studies is very important to get 'good' results.

- Subjectivity in the selection of studies is assumed as biggest bias in meta-analyses but if not purely but there are some rules of objectivity for choosing a study through which the researcher has to ensure about the similarity among studies on various aspects like source of publication, year of study, methodology used, tool used, statistics applied, variables under observation etc., however when a study does not match with any of the aspect, researcher has to drop out that particular study.

- The studies included in meta-analyses would always be based on causality based on evidences and if it does not provide that then meta-analyses cannot just magically draw the conclusions.

- It's a common assumption that Meta-analyses has adequate strength to detect the variable that affects the direction and strength of the relation between dependent and independent variables than individual studies which is certainly true as it is not possible in other primary studies.

- Publication bias is always being calculated while performing meta-analyses as it is assumed that published studies tend to show stronger results than unpublished, therefore to know publication bias 'fail-safe number' is to compute. A low number indicates possible publication bias but a high number does not necessarily shows the lack or non existence of it. It is known as file-drawer analysis; this problem is likely to be a problem for a particular review or meta-analysis. It is a valid indicator of possible publication bias.

- There is no possibility of using raw data or primary data in meta-analysis and even it is not feasible to perform meta-analysis on the raw data because the results from single unit cannot be generalised about a particular setting. The effect sizes in meta-analysis produce the results on an average basis; however it may be possible that there would not be even a single study which describes the relationship by overall effect size. A single overall effect size can possibly sum up whole literature under review.

## Criticism

Meta-Analyses is widely accepted in medical science for producing tremendous effective results for various medicines but there are many reasons to criticise meta-analyses especially when it is applied to social science or education field because as it is very difficult to predict any human beings' behaviour so it's' difficult to persuade everyone in the field of social science to accept something wholeheartedly. There is variety of criticism present for meta-analyses as discussed below:

- There is a drawback on the part of meta-analyses that it just synthesise and generalise Quantitative studies and completely ignores Qualitative aspect of the studies as it is very important for knowing the application contribution of the study.
- The subjectivity in the selection of sample studies is another criticism of meta-analyses because there is few important studies which left due to certain reasons or deliberately left for not matching with the criteria of coding the studies, however important the study is.
- A frequent criticism of meta-analyses is that it focuses on overall summary effect and completely ignores the treatment effect which may vary from study to study. Meta-Analyses reflect the average effect size of all sample studies under observation leaving the fact of contribution the individual effect size of each study which according to some educationists leads to wrong conclusions, because one study may be contributing 60 percent and other may be just 1 percent.
- File Drawer problem in meta-analyses also question to its contribution in the area as it is possible that if the studies included in meta-analyses are based on any kind of biased sampling then the mean effect reported in meta-analyses will also reflect bias.
- One often heard phrase is 'Garbage In, Garbage Out', which means if the low quality studies are being included in meta-analysis then it is best possible to get only poor quality results because the basic errors in the primary studies would be carried over to meta-analysis where the identification of errors is not at all possible.

## Conclusion

This paper is an effort to present a relatively significant innovation in the methodology of educational research for initial researchers so that the essentials, basic concepts, goals, myths & realities would be known to them. In our country, the idea of

meta-analysis research was not presented adequately therefore it has not been much appreciated in the past but it's seeking hike now days. Meta-Analysis has essentially changed quantitative research, which led to great progress, especially in the field of teaching. The potentiality of quantitative integration and synthesis has expanded the areas of empirical research of pedagogical issues. This discussion is just an aim to present a new idea of research and at the next stage of articles the technical points of meta-analysis will be surely discussed in details with the help of working examples.

## References

1. Aguinis, H., Pierce, C. A., Bosco, F. A., Dalton, D. R., & Dalton, C. M. (2010). Debunking Myths and Urban Legends About Meta-Analysis. *Organizational Research Methods*, *14*(2), 306-331. doi:10.1177/1094428110375720

2. Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2009). Introduction to Meta-Analysis. doi:10.1002/9780470743386

3. Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, *1*(2), 97-111. doi:10.1002/jrsm.12

4. Costafreda, S. G. (2011). Meta-Analysis, Mega-Analysis, and Task Analysis in fMRI Research. *Philosophy, Psychiatry, & Psychology*, *18*(4), 275-277. doi: 10.1353/ppp. 2011.0049

5. Cumming, G. (2012). Applied Meta-Analysis for Social Science Research by Noel A. Card. *Australian & New Zealand Journal of Statistics*, *54*(2), 252-253. doi:10.1111/j.1467-842x.2012.00659.x

6. Fitz-Gibbon, C. T. (1985). The Implications of Meta-analysis for Educational Research. *British Educational Research Journal*, *11*(1), 45-49. doi:10.1080/0141192850110105

7. GLASS, G. V. (1976). Primary, Secondary, and Meta-Analysis of Research. *Educational Researcher*, *5*(10), 3-8. doi:10.3102/0013189x005010003

8. Landers, R. N. (2011). Stats and Methods Urban Legend 3: Myths about Meta-Analysis [Web log post]. Retrieved from http://Www.Neoacademia.Com