

IN -SERVICE TEACHER TRAINING ASSESSMENT IN SOUTH ASIAN REGION: A CRITICAL META ANALYSIS PERSPECTIVE

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Abstract

The current study investigates the assessment practices in in-service teacher training programs in South Asian regions. The aim of this research is to systematically synthesize the literature on the teacher professional development construct and assessment design data to decode the training effect on the performance of social studies teachers. This paper analyses the training assessment design along with associated factors contributing to the high effect size of the training. To this purpose, a meta-analysis approach with a mixed method approach consisting of estimation of the effect size of different in-service training assessments followed by qualitative synthesis of information on training design has been adopted. The findings of the study showed that the pooled effect size of in-service teacher training at the secondary level was 0.51 which is considered an 'intermediate effect' as per the effect size classification of Cohen, 1988. As further revealed by this study, around 50% of the studies were conducted with a pre-post comparative design where the effect size was 0.78 (High effect) with a variation in the range of 0.70 to 0.81 in each study. Further, 7% of the studies were conducted with PSM research design where the effect size was 0.01 (No effect). Similarly, 29% of the studies were conducted with a time-series design where the effect size was 0.29 (low effect) with a variation in the range of 0.01 to 0.45 in each independent study. Contrastingly, it is found that 14% of the studies were conducted with RCT research design; considered as one of the robust designs to eliminate the selection biases, where the effect size was 0.34 (Moderate effect) with the variation in the range of 0.31 to 0.38 in each study. This indicates a trend that the research studies adopting the pre-post comparative research design had more effect size on in-service training programs than any other research design in the South Asian region. Therefore, the discussion around the issues of RCT and PSM as good designs in the field of quantitative measurement of intervention and at the same time less usage of this design invites the attention of policymakers and assessment experts in this knowledge domain.

Key Words- *Meta-analysis, In-service Teacher Training, Social Studies, Secondary Education*

Backdrop

Secondary education is an important stage in the educational hierarchy as it prepares the students for higher education and for reaching the world of earning livelihood (NEP, 2020). Therefore, it is a great need to strengthen this stage by providing greater access and by improving the quality of education in a significant way. The development of quality, to a large extent, depends on the skill and competency of the teachers who can work as a catalyst and claims a greater chunk of stock in the development and success of an educational program (Panda, 2015). For the last few decades, several efforts have been made to increase the quality of the educational system as a whole and more particularly in the mode of curriculum transaction and method of teaching at the secondary level which has pushed the teacher to undergo a paradigm change from the role of an instructor to a facilitator. The recent changes in instructional technology brought significant changes in the realm of teacher education, and in the meantime, several steps were taken to upgrade the skill of the teacher to let them cope with the need and aspirations of society and students.

A working teacher needs to be updated and refreshed regarding his/her knowledge and professional skills which are imparted through training (NCFTE, 2009). In a step to realize this need, the Govt. has published guidelines from time to time in collaboration with academic bodies like the National Council of Educational

Research Training (NCERT) to improve the quality of in-service teacher education programs across the country.

In-service training is accepted as an effective method of increasing the knowledge, skills, and positive beliefs of teachers. It is a process used to continue and refresh teachers' education following completing academic certification in teaching and being employed in a professional position (Locke, 1984). The Education Information Network in the European Union (EURYDICE) defines in-service training as a variety of activities and practices in which teachers become involved to broaden their knowledge, improve their skills and assess and develop their professional approach' (Perron, 1991).

The importance of continuous professional development of teachers has been explicitly emphasized in different commissions and committees. Following this, the system has responded to these areas by creating structures and institutions for this purpose and providing increasingly more financial support for these activities. Following the Kothari Commission's report, in several states, school clusters were created to forge inter-linkages between primary, middle, and high schools and provided a forum and structure for interactions between teachers and receiving professional inputs. Following the NPE 1986, in-service teacher education received support through central government funding for the establishment of Institutes of Advanced Studies in Education (IASE) to chosen University Departments of Education and District Institutes of Education and Training (DIET) in each district to provide a space for the conduction of in-service courses for teachers of elementary and secondary schools.

Despite all the policy provisions and continuous professional development, teachers' familiarity with the latest educational developments remains insufficient (Liana,2015). Teacher education is currently facing a quality concern problem. Therefore, teacher quality is still a top priority policy issue for national and state education policymakers. Second, the importance of evaluation of teacher training programs for social studies teachers is more important in a context where the interest of the students in subjects like mathematics, science, and computer science is continuously shifting, and, in the meantime, they lose interest in the social science studies (Liana, 2015). The fading interest of students in social science subjects creates a vacuum in the mindset of the students to understand societal issues and understand their role in sensitive social matters (Liana,2015).

Therefore, keeping the above context in mind, the current meta-analysis study was taken to better understand the process and ways of evaluation of teacher training programs by reviewing and synthesizing practices and evidence of in-service teacher training assessment in south Asian regions. This study has a critical policy imperative since it draws the best experiences of assessment approach of in-service training assessments and critically analyzed all the available literature in these areas with the following hypothesis/research questions.

Key Hypothesis/Research Questions of the Study

1. There is an effect of In-service training programme on the performance of social studies teachers at secondary level.
2. How the design of the research studies related to secondary in-service training programme has been varying in due course of time?
3. How the effect size of in-service teacher training of a study is relational to its research design?

Review of Literature

Review on the Theoretical Constructs of In-service Teacher Training

A systematic review of assessment approaches to in-services training program requires an exploration of the very construct of professional development and training in an educational context. Freeman (1989) defines training as the learning of discrete teaching items. In a training program, the collaborator (or tutor) oversees these discrete stratagems to teachers so that they improve teaching skills such as presenting vocabulary, responding to student answers, and others. Development, according to Freeman, is about helping teachers to develop constant awareness of their experiences as professionals. In professional development, the collaborator's role is to help teachers to reflect upon their teaching.

Richards and Farrell (2005) further differentiate the terms training and development. These authors define training as actions that teachers perform and that have an immediate impact on their contexts. In their view, training is about preparing teachers for the teaching task itself, that is, techniques that would help them cope with teaching situations such as adapting materials and grouping learners among others. Development, in contrast, involves teachers' knowledge of themselves and of their teaching situations. Whereas training is a top-down approach to teacher education—experts decide what comprises training programs—development is

bottom-up because it “often involves examining different dimensions of a teacher’s practice as a basis for reflective review” (Richards & Farrell, 2005, p. 4). Among the dimensions that Richards and Farrell address are, for example, the understanding of how students learn language and the analysis of teachers’ philosophies for language teaching.

Richards (2011) explores ten core dimensions that, in his mind, make up the profile of exemplary in-service teacher training. The dimensions range from knowing the language of instruction to the capacity to derive theory from practice.

The first dimension is called the language proficiency factor. As defined by Richard, teachers need to possess a series of skills related to how they use language. One of those skills is providing input at a level that is appropriate for learners. The second dimension is the role of content knowledge, which is divided into two: disciplinary content knowledge and pedagogical content knowledge; the former is specific to language teaching and involves knowledge of the history of this field. The third-dimension entails teaching skills. Richards argues that these are the types of competences that teachers develop over time in professional development programs and because of reflective teaching.

Richards (2011) states that “teaching from this perspective is an act of performance, and for a teacher to be able to carry herself through the lesson, she has to have a repertoire of techniques and routines at her fingertips”. Richards argues that teaching skills are the result of teachers’ decision-making and as such should be considered in teacher training. The fourth dimension is contextual knowledge, which refers to the knowledge that teachers have about the conditions and human and material resources of the contexts in which they teach; knowing the school curriculum and policies for disciplinary issues fall into this dimension. The fifth dimension he explores is teacher’s identity; this reflects the different roles that teachers are expected to display depending on school policies and even the cultures where they teach. Richards (2011) defines identity as “the differing social and cultural roles teacher learners enact through their interactions with their students during the process of learning”

The sixth dimension in a teacher’s profile is referred to as learner-focused teaching. Richards argues that teacher performance can be influenced by student learning and that exemplary teachers familiarize themselves with student behaviour, devise teaching practices based on this knowledge, and keep students engaged during lessons. Making the classroom a community of learning and personalized teaching are two skills that fall under the category of learner-focused teaching. Pedagogical reasoning skills is the seventh dimension the author defines; it denotes teachers’ ability to make informed choices before, during, and after class. These skills are shaped by the actions, beliefs, knowledge, and opinions teachers have of themselves, their learners and their contexts.

Richards argues that teachers’ philosophies should be addressed in in-service teaching program because they help teachers learn. Teaching philosophies are shaped by the ability to reflect upon experience and arrive at principles for teaching and learning. This is the eighth dimension, called theorizing from practice. The ninth dimension involves belonging to a community of practice. The author explains how teacher communities should work together toward common goals and engage more individualistic members to share with the community at large. Lastly, professionalism is the tenth dimension, and it relates to the idea that teachers are the accountable social agents, because of this, they should be familiar with what is current in the field. More importantly, Richards suggests that teachers must be critical and reflective upon themselves and their practices.

Review on the Construct of Effectiveness of In-service Teacher Training

In related literature on in-service training, there are different indicators for the measurement of the effectiveness of programs. According to Ahmadi & Keshavarzi (2012), “effectiveness means to study in-service training programs in respect to their objectives, contents, performances, time, place and motivation”. (p, 921). While, according to Cimer et al (2010), the following five indicators demonstrate the main characteristics of an effective in-service training program. The first indicator is careful planning of the training programs based on accurate need assessment. It is very important to match what the course offer with the need of teachers. Do teachers feel the necessity for in-service training for their professional development? According to Ozer (2004), the needs, interests, and attitudes of teachers about professional development and in-service training is the most important factor of effective in-service training.

The time and duration of any in-service training program is the second indicator of its effectiveness. Courses that are conducted during the school period or those conducted in the evening are not favored by teachers. The third indicator is the administration of the training, comprising methods of teaching, facilities, and skills of the course instructor. According to Joyce and Showers cited in Cimer et al (2010), the combination of different methods such as presentation, modeling, practice, feedback, and coaching enhances the effectiveness of In-service training programs. An instructor or trainer’s quality and knowledge of the topic and effective

teaching ability have a significant impact on the effectiveness of the program (Ayes et al 2007, cited in Cimer et al 2010).

Sauja et al (2002) studied the effect of in-service teacher training on secondary social science teachers in India. As an indicator of teacher performance, they selected 'classroom practice' and 'teacher's knowledge about the training content' which worked as a major outcome of teacher performance. The study was done with 150 social science teachers who were picked from 7 districts of Gujrat. The design of the study was 'one group pre-post design' where the teachers were tested on the outcome variables i.e 'classroom observation' and 'knowledge about the training content before the training. The same cohort of teachers was post-tested on the same predictor variables. The results of the study showed that the in-service teachers benefited from the in-service program significantly as the gain from pre-test to post-test in both 'classroom practice' and 'teacher's knowledge about the training content' was statically significant at 0.01 level of significance.

Review on the Effect of in-service training program

Education research that measures the effects of teacher preparation and development has developed and expanded since the 1990s. Kennedy carried out one of the first reviews of research on the relationship of quality of teacher preparation to subsequent student achievement three decades ago (1998). At that time, she identified a relatively small number of research studies that were able to draw a direct link between the level of teacher preparation in their teaching field and the achievement of students. Darling-Hammond (1999) analyzed large-scale assessment data across the states, and her research results showed that teacher preparation in the field was positively related to student achievement. These study findings resulted in extensive policy and research debate, that continues, about the importance of formal teacher preparation and qualifications, including teacher certification.

More recently, several major research synthesis projects have broadly analyzed evidence on the effects of mathematics and science teacher preparation and development initiatives on student achievement. One approach to reviewing evidence across studies is to apply a logic model and to examine the relationship of teacher preparation on student achievement through effects on intervening variables such as teacher knowledge and instructional practices (Clewel et al., 2004; Ingvarson, Meiers & Beavis, 2005). This kind of full analytic model allows educators and leaders to identify key decisions about the organization, delivery, and support of teacher development that are ingredients to positive outcomes.

The studies of Mizuno (2004) and Yang (2005) affirmed that teachers viewed in-service education to be more effective when the content of the training is based on their self-reported needs. They also found the important factors that can improve teachers' willingness to participate in in-service training programs. These factors are (1) competent resource persons, (2) involvement of trainees in the training process, (3) consultation with teachers to assess their needs, and (4) support to teachers to implement new ideas/innovations acquired in in-service training programs.

The studies reviewed in the above section provided a brief description of the development of teacher training programs in South Asian regions. The concept of evaluation of the in-service training program was prevalent since the time the in-service program was conceived. However, the effect measurement process was largely different from county to county and even if there were intra-country variations in terms of key targeted areas, used tools and techniques, the methodology adopted for the study and analysis and interpretational techniques. Therefore, a systematic critical review of the existing literature through meta-analysis around the key research hypothesis/questions of the current study will have great implications for policy in developing an assessment of in-service teacher training programs.

Methodology

The study employed a meta-analysis technique to systematically review the literature and synthesize the evidence from the different literature. Meta-analysis was used to synthesize the previous studies. One of the primary advantages of a meta-analysis is the potential to address biases that may influence a conventional literature review (Lipsey & Wilson, 2001; Moody, 1990; Wolf, 1986). Such biases include a variety of researcher biases affecting the selection of studies and the synthesis of seemingly incongruent study findings. Other biases specifically about meta-analyses include publication bias and statistical biases related to the combination of potentially heterogeneous effect sizes derived from primary studies with diverse samples and methodological approaches (Wolf, 1986). The research design for the meta-analysis presented below was formulated to address such biases.

Delineation of the domain of the study: The subject area of the studies concerning selection criteria of variables, nature of the training, and respondents were clearly defined.

Delineating the study to a particular geographical region: To reduce geographical biases, the region has been defined and the selection of the studies was done from the defined regions only.

Defining the nature of the publication of studies: The publication bias was checked with the development of clear selection guidelines. For this, the selection criteria for the nature of the publication of articles, thesis, and unpublished research papers were clearly defined.

Defining the nature of the study: The objectives related to the calculation of the effect size of the in-service teacher training program conducted from 1990 to 2017 were done through meta-analysis. For this, the researcher only used the existing data that was present in the different related studies to calculate the overall effect size of the training.

The studies which met the selection code were included in the final phase of meta-analysis and the overall effect of the training program on the performance of social studies teachers was calculated.

Data collection for Meta-analysis

The data required for meta-analysis were collected from the previous literature. During the review process, resources visited NCERT Library, Library of RIEs, ICSSR, and reviewed Governmental Survey Reports. In the meantime, different internet search engines were used to cover as much as studies as possible. The selection of studies was done based on screening criteria which has been given in the following section.

First level Screening Criteria of studies for inclusion in Meta-Analysis

The selection of relevant studies can be a primary source of researcher bias. One way of overcoming this bias is to formulate explicit inclusion and exclusion criteria that provide unambiguous direction to the selection process. The selection criteria should accurately represent the substantive domain of inquiry as well as consider the degree to which studies with different methodological characteristics can be meaningfully combined into a common metric (Hall, Tickle-Degnen, Rosenthal, & Mosteller, 1994; Lipsey & Wilson, 2001; White, 1994)

During the selection stage of studies into meta-analysis, it was ensured to select studies with a standard process free from any selection bias. For this, explicit selection criteria was developed to nullify the probability of selection bias as much as possible. The studies were scrutinised with the following criteria at first level before they are sent to the second level of screening.

Publication criteria of research studies

- The research work published in a referred/non referred journal, periodicals, digital research logbook.
- Any unpublished research work done at master level, and doctoral level.
- Any research work uploaded in any digital library.
- Projects undertaken by various educational research bodies.
- Funded projects undertaken by any non-profit /non-governmental organizations.

Geographical, timeline and area of teacher training criteria

- The studies need to be conducted in the developing countries in South Asia.
- The study needs to measure the effect of teacher training (on the performance of teacher) at secondary level in their respective country (The inter-country variation in terminologies for secondary education were taken into consideration).
- The studies must be related to the in-service training program conducted at secondary level.

- The studies should be exclusively for the social studies teachers.
- The study needs to be conducted within the time frame of 1990 to 2017.

Eligible research design, language criteria

- Any research design with the features of quantitatively measuring the effect of teacher training and in the meantime have detailed description about the rationale of its selection.
- The research studies needed to be written in English language.

Second level selection criteria of studies for inclusion in meta-analysis

- The Minimum sample size of the studies need to be greater than 20.
- The analysis of the studies needs to be done with parametric and non-parametric test.
- Full description pertaining to the sample size, data collection tools, scoring procedure of data and detailed information pertaining to statistical measures are available in each study.

Procedure of searching

In meta-analysis, it was tried to collect as much as studies as possible to reach at the conclusion pertaining to the effect of teacher training program which could be generalizable to the whole population. Therefore, in this search operation, digital media played an important role as these days' internet-based search engine are proved to be one of the largest stocks of resource material for any given task.

Therefore, in the current study, web-based search engines were used to locate relevant research papers, research studies, doctoral research work with the following procedures.

Search software used

The search engine like Google, Google scholar, Cortana, Bing, Yahoo search engine were used to search the relevant studies for the meta-analysis. In addition to it some dedicative research libraries like ERIC, PsycINFO, ProQuest, EBSCO host Academic etc., were systematically explored to track the relevant literature needed for this research.

Keywords used to enter databases and registries

The searching of studies was done with the use of key words like 'in-service teacher training program', 'impact of in-service teacher training program', 'study on teacher training at secondary level', 'in-service training program for social studies teachers', 'meta-analysis', 'meta-analysis on in-service teacher training program', 'In-service teacher training program in south Asian region', 'doctoral research on in-service teacher training', 'journal on teacher training program'.

Web based research periodicals referred

In addition, searches were conducted targeting certain periodicals, namely, Review of Educational Research, Educational Evaluation and Policy Analysis, Education Policy Analysis Archives, TC Record, Journal of Research in Science Teaching, Electronic Journal of Social Science Education, Research in Impact Evaluation Education, Journal of Science Education and Technology, Electronic Journal of Literacy Through Science, Taylor and Francis Group of scholarly periodicals, ERS Spectrum, and School Science and Mathematics. Journals from associations such as the National Association for Research in Science Teaching, and the American Educational Research Association (AERA) were reviewed.

Reference and citation databases searched

As cascading search procedure was followed in this study to search as many as studies as possible. For that matter, the reference and citation of the studies were followed and later the work of the researcher tracked from the reference and bibliographic section of the unpublished and published research papers were searched on the internet-based search engines.

Miscellaneous means of data collection for meta-analysis

Especially in India, Right to Information (RTI) act, 2009 was used to seek the information on in-service teacher training program from the concerned Govt. dept. at state level. In this process, RTI case was filed in favour of the ministry of mass and school education seeking information on the following points.

- Is there any in- service training program conducted at secondary level for social science teachers in state during the time period of 1990 to 2017?

- If, yes, then how many social science teachers were trained through the in-service teacher training program organized at secondary level?
- Is there any research project undertaken by any state level research organization like State Council of Educational research and Training to measure the effectiveness of in-service teacher training program organized at secondary level during the time period of 1990 to 2017?

Process for determining study eligibility

Aspects of reports were examined (i.e, title, abstract, and/or full text)

The eligibility of the study was decided based on review at two stages. In first stage, the abstract of the papers was reviewed, and, on that basis, it was selected for the second-round review. The review process at second round was a more robust. Robust review in the sense the paper was scanned with respect to its methodology, statistical technique, and description about used tools and technique, rational for selection of variables and measurement process of that variable etc, before being considered for inclusion into meta-analysis.

Inter-coder reliability test

To reduce the selection bias of the researcher for selecting a particular study into the meta-analysis, inter-coder reliability test was conducted. For this following procedure was adopted.

- A list of code was assigned to the different component of studies i.e research design, sample, used statistical technique, used tools/technique, interpretational technique
- A score was assigned to each code earmarked for different components of the study
- At first phase, the researcher coded all the studies and assigned score to each study based on pre-defined scoring procedure
- At second phase, the studies were handed over to a reviewer with a request to score the studies as per the pre-defined scoring procedure
- The total score given by the research to a particular study and the score given by the reviewer for the same study were matched to see the difference.
- The final selection was done based on review results (an error margin of 5% was considered for the selection.)

Indication of agreement

The review score of the studies was tabulated with reference to research design, sample size, used tools and technique, used statistical technique. If the score given by the researcher and the external reviewer for study remained equal, then the study was selected on the basis mutual agreement.

Process to sort out inter coder disagreements

An error margin of 5% (the difference of score given by the researcher and external reviewer) was allowed for the final selection of the study. On spot reviews was done for some of the studies when the error margin was exceeded over to 5%. To sort out the difference, a spot review was done, and final call was taken based on mutual review score of researcher and external reviewer.

Selection of the Studies

The finalization of the studies was done in the following manner

- All total 67 studies met the screening criteria at the first attempt. Further review was done to see whether the studies were meeting second level selection criteria.
- On second level of selection criteria, all total 16 studies selected for inter –reviewer reliability assessment
- Finally, 14 studies selected for meta-analysis who scored more than 90% in inter-reviewer assessment

Statistical Technique Used

The following inferential and descriptive statistical techniques were used in the study. For this the software like Excel and SPSS were used.

- **Cohen's d** –It was used to calculate the effect size of the studies with equal sample size between the two sets of observation.
- **Cramer's V**-It was used to calculate the effect size for non-parametric data. Especially where the data was collected from scale with the result obtained in chi-square.

- **Hedge's G-** It was used to calculate the effect size of the studies with unequal sample size and standard deviation between the two sets observations.
- **Glass's Delta-** It was used to calculate the effect size of the studies with unequal standard deviation between the two sets observations.
- **The inferential statistics like "t" test** was used to test the significance of difference between the two sets of observation.
- **Arithmetic Mean,** - It was used to calculate the mean effect size of independent studies

Procedure of calculation of effect size of a study with more than one variable/outcome variable

The effect size of studies with more than one variable was calculated separately by considering the nature of tool and statistical details. Each effect size for separate variable was weighted as per the effect size interpretation metrics and the average of all effect size used in the study was calculated to reach at a total effect size of that study. Averaging each independent effect size was called the pooled effect size.

Procedure of Assigning of Impact Size Measure:

As cited in above section, different statistical technique was used as the nature of the studies included in the meta-analysis were different on the ground of 'sample size' and 'standard deviation'. In the meantime, the quantification of outcome variables was done in a different scale of measurement. Therefore, the selection of "effect size measure" for a particular study was decided based on major three factors i.e scale of measurement (Nominal/Interval/Ordinal /Ratio), sample size, and standard deviation.

Procedure of Effect size averaging /or weighting method(s)

For the interpretation of effect size for the different effect size measures the following effect size and interpretation index was used.

For interpretation of the results pertaining to Cohen's D, Hedge's G and Glass's Δ , the following interpretation index were used. This index was developed by Cohen in the year 1988 which was revised in 1999.

Table 1: Effect size and interpretation index for Cohen's D, Hedge's G and Glass's Δ

Effect Size (ES)*	Interpretation	Weightage score
ES (Less than 0.0)	Adverse effect	0
ES (0.01 to 0.19)	No effect	1
ES (0.20 to 0.49)	Small effect	2
ES (0.50 to 0.79)	Intermediate effect	3
ES (More than 0.80)	Large effect	4

*Source Cohen's effect size index, 1988

However, the effect size index for non-parametric test like chi-square test (where the data is gathered in a nominal and ordinal scale) is quite different from the above classification. Therefore, in case of studied with non-parametric statistics, the Cramer's V effect size index was used.

Table 2: Effect size and interpretation index for Cramer's V

Effect Size (ES)*	Interpretation	Weightage score
ES (Less than 0.0)	Adverse effect	0
ES (0.01 to 0.09)	No effect	1
ES(0.10 to 0.29)	Small effect	2
ES (0.30 to 0.49)	Intermediate effect	3
ES (More than 0.50)	Large effect	4

Though there was variation in interpretation of effect size for different effect size measure, so the weightage score was used to interpret the pooled effect size of all the studies.

Findings

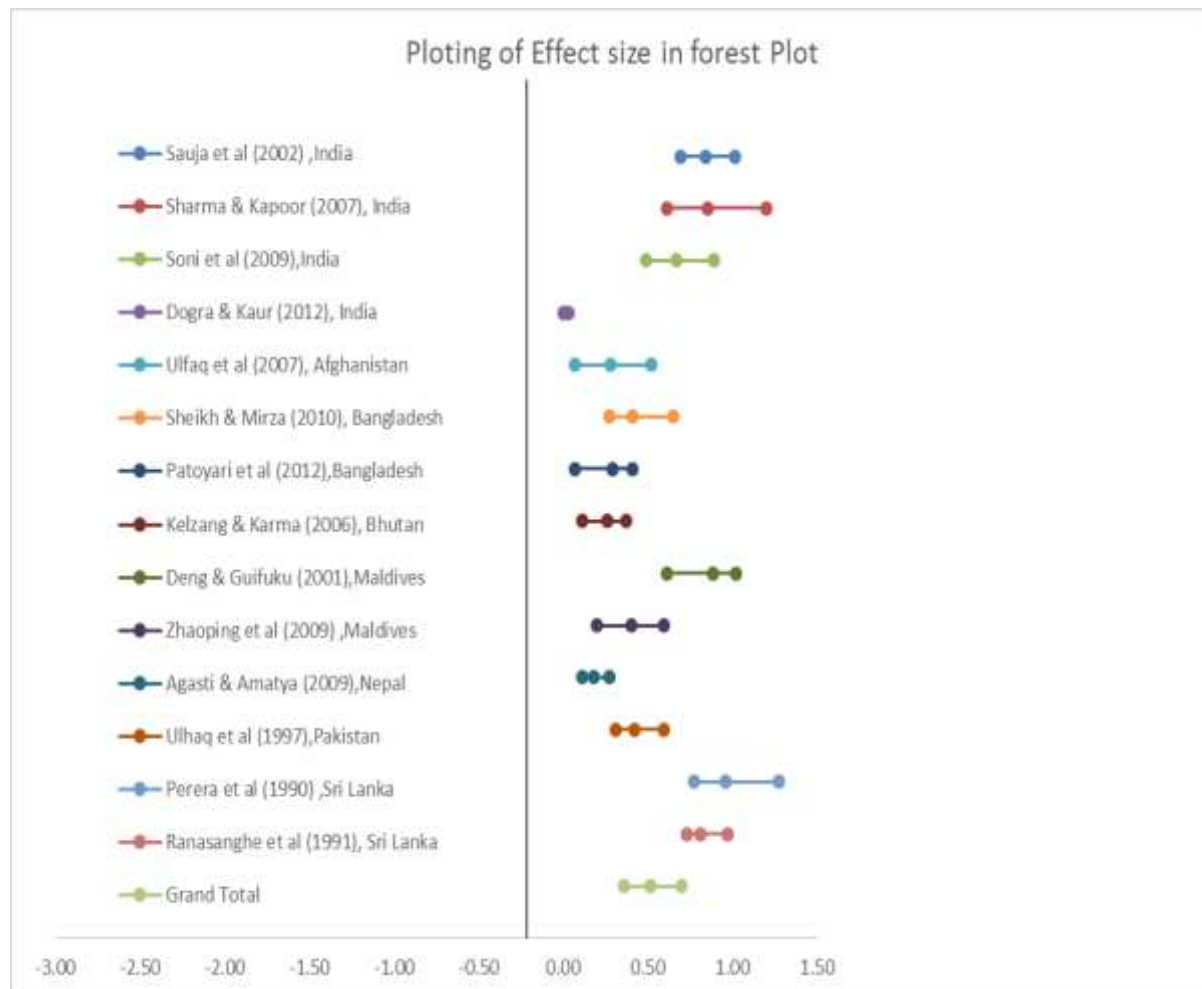
Analysis of data pertaining to hypotheses -1:

With reference to the hypothesis 1, the pooled effect size of all 14 studies was calculated and the results of all the studies were depicted in the forest plot.

The results depicted in figure 1, showed that the pooled effect size of in-service teacher training at secondary level was 0.51 which is considered as ‘intermediate effect’ as per the effect size classification of Cohen, 1988.

Therefore, the formulated hypothesis-1 i.e “there is effect of In-service Training Programme on the performance of social studies teachers at secondary level.” Is accepted.

Figure.1: Pooled effect size of selected studies for meta-analysis



Analysis of data pertaining to Research Question-2:

With reference research question -2 i.e how the designs of the research studies related to secondary In-service Training Programme have been varying in due course of time, in Indian context (table 4.15), four studies were found which could meet the selection criteria of meta-analysis. In three of the studies, conducted in 2002 Sauja et al,(2002) , 2007 Sharma & Kapoor (2007), and 2009 Soni et al (2009),India , “Pre-Post-test Design” were used, whereas in one study conducted in 2012 Dogra & Kaur (2012), India “ Mixed Method i.e true experimental design with propensity score matching (PSM) Technique with Focus Group Discussion” were used.

PSM as a technique of assignment of participant of project and control group was used first time in India in 2012 (Dogra & Kaur (2012), India) to measure the impact of the teacher training.

Table 3: Studies with research design in Indian context

Study Meta-analysis Code	Used design	Check point for selection bias
Sauja et al (2002), India	Pre-post design	The same cohort was tracked before and after the training
Sharma & Kapoor (2007), India	Pre-post design	The same cohort was tracked before and after the training

Soni et al (2009),India	Pre-post design	The same cohort was tracked before and after the training
Dogra & Kaur (2012), India	Propensity Score Matching (PSM)	The PSM score of teachers those who had undergone the training was calculated On the basis of PSM, a paired group of teachers were identified who had not undergone the training

Use of research design in other Asian countries

Out of the studies conducted in other Asian countries (table 4.16) who could meet the selection criteria of meta-analysis, four of them conducted in 1990 (Perera et al (1990) ,Sri Lanka), 1991 (Ranasanghe et al (1991), Sri Lanka), 1997 (Ulhaq et al (1997),Pakistan) and 2001 (Deng & Guifuku (2001),Maldives) , the “Pre-Posttest Design” was used whereas, in two of the studies conducted in 2007 (Ulfaq et al (2007), Afghanistan) and 2009 (Zhaoping et al (2009) ,Maldives) , “ Randomized Control Trial (RCT) design ” was used. In other four studies conducted in the year 2006 (Kelzang & Karma (2006), Bhutan), 2009 (Agasti & Amatya (2009), Nepal) , 2010, (Sheikh & Mirza (2010), Bangladesh) and 2012 (Patoyari et al (2012),Bangladesh) , “Time Series Design” was used respectively.

Table Error! No text of specified style in document.: Studies with research design in Asian region

Study Meta-analysis Code	Used design	Check point for selection bias
Ulfaq et al (2007), Afghanistan	Randomised Control Trial (RCT)	On some key background (geographical area, teaching experience, educational qualification, age gender) variables the group were controlled Random assignments were done for the control and intervention group
Sheikh & Mirza (2010), Bangladesh	Time Series (TS)	The same cohort tested at different phase of training
Patoyari et al (2012), Bangladesh	Time Series (TS)	The same cohort tested at different phase of training
Kelzang & Karma (2006), Bhutan	Time Series (TS)	The same cohort tested at different phase of training
Deng & Guifuku (2001),Maldives	Pre-post design	The same cohort was tracked before and after the training
Zhaoping et al (2009) ,Maldives	Randomised Control Trial (RCT)	On some key background (teaching experience, teaching aptitude, gender) variables the group were controlled
Agasti & Amatya (2009),Nepal	Time Series (TS)	The same cohort tested at different phase of training
Ulhaq et al (1997),Pakistan	Pre-post design	The same cohort was tracked before and after the training
Perera et al (1990) ,Sri Lanka	Pre-post design	The same cohort was tracked before and after the training
Ranasanghe et al (1991), Sri Lanka	Pre-post design	The same cohort was tracked before and after the training

Analysis of data pertaining to Research Question-3:

The third research question of the current study as to see “How the effect size of in-service teacher training of a study is relational to its research Design?”

It is found that 50% of the studies were conducted with post comparative design where the effect size was 0.78 (High effect) with the variation in the range of 0.70 to 0.81 in each individual study. Figure **Error! No text of specified style in document..2** : Forest plotting of studies with pre-post design

Approx. 7% of the studies were conducted with PSM Research Design where the effect size was 0.01 (No effect).

Figure 2: Forest plotting of studies with PSM design

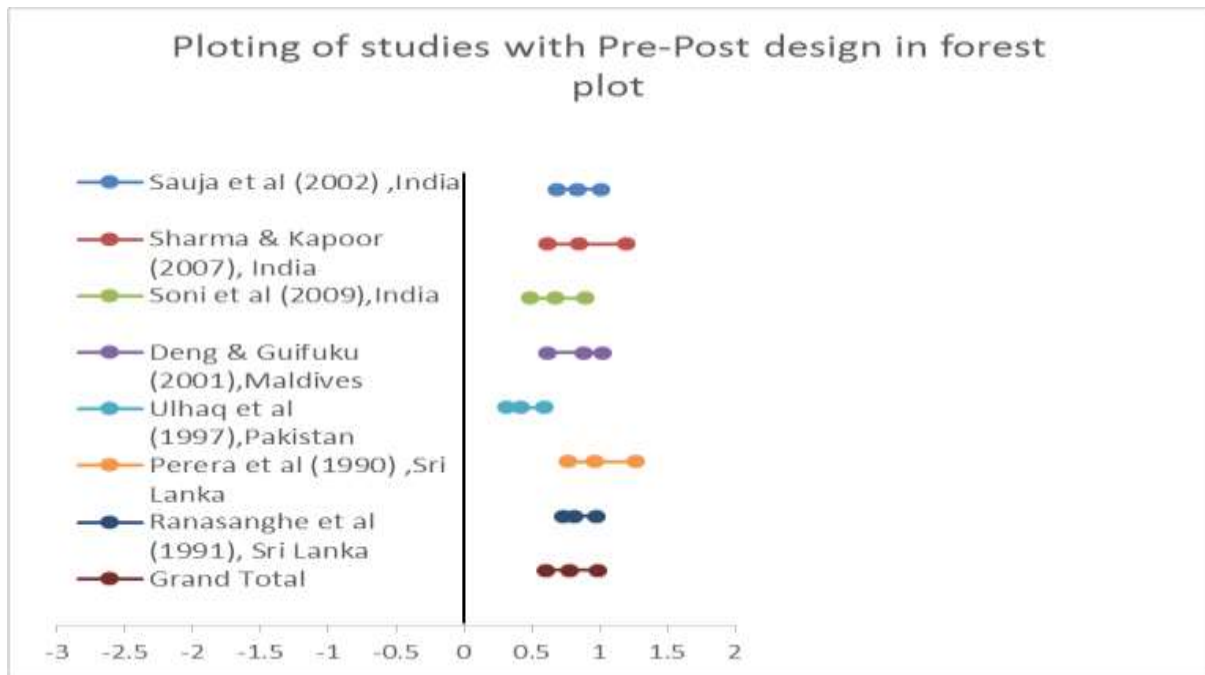
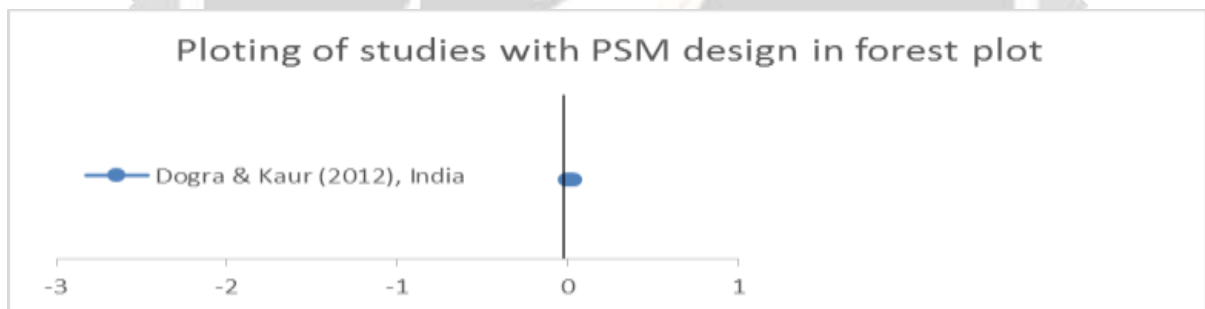
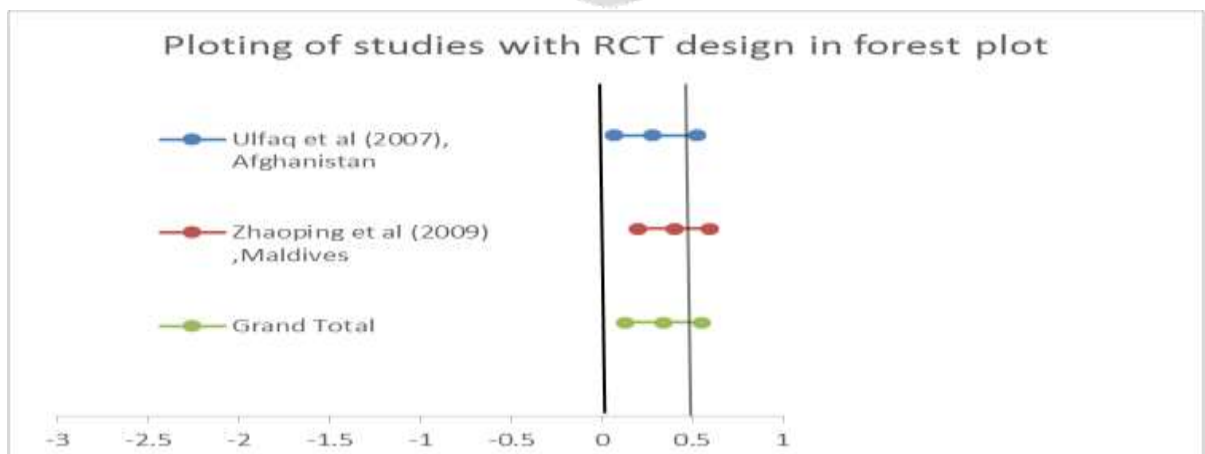


Figure 3: Forest plotting of studies with PSM design



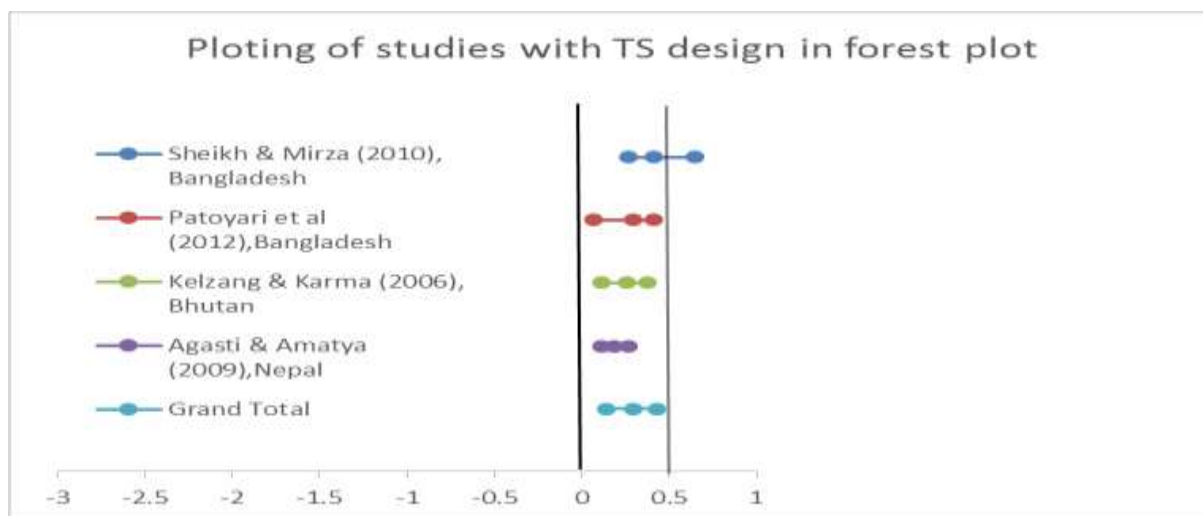
It is found that 14% of the studies were conducted with RCT Research design where the effect size was 0.34 (Moderate effect) with the variation in the range of 0.31 to 0.38 in each individual study.

Figure 4: Forest plotting of studies with RCT design



Approx. 29% of the studies were conducted with Time-series Design where the effect size was 0.29 (low effect) with the variation in the range of 0.01 to 0.45 in each independent studies.

Figure 5: Forest plotting of studies with TS design



Analysis of effect size in relation to research design

It is found that the research studies adopting the Pre-post comparative Research Design had more effect size on in-service training program than any other research design in South Asian region.

Discussion

Discussion of results pertaining to hypothesis 1

The results showed that the in-service teacher training programs had effect on the performance of social science teachers at secondary level. However, the domains as an indicator of teacher's performance, which had been included in the study were limited to 'classroom practice', 'training related content knowledge' and 'teacher's perception' in Indian context. However, in South Asian region, in addition to the above three aspects, some other domain of performance 'like evaluation skill', 'pedagogical knowledge', 'classroom transaction process', teaching readiness, teaching aptitude, and motivation for teaching were measured. As observed by Smith (2014), the performance of the teacher is associated with the major four domains i.e psychological aspect, academic aspect, social aspect and economical aspect. He further noted that the psychological aspect as a construct of teacher performance deals with the job satisfaction of teacher, attitude towards professional development program, mental readiness for teaching, mental health and hygiene, motivation for teaching and defence and stress management mechanism. The observation of smith on the constructs of teacher's performance gives a perspective to develop the in-service teacher training program by targeting the areas which can play a role of catalyst to improve the overall performance of teacher in and off the classroom. If the in-service teacher training whose effect had been measured in the current study, will be seen from the Smith's perspective of teacher performance, then the training needs to take care of many aspects from psychological, academic, social and economic aspects of teacher performance.

The results of meta-analysis showed that the effect of in-service teacher training program was not common across the countries. For that matter, the effect of in-service training was high in Sri Lanka followed by Maldives, India, and Bhutan. The effect of the training program was evidently less in Nepal.

Discussion of results pertaining to research question -2

The results pertaining to the use of research design in selected studies in meta-analysis showed that pre & post-test design was used in almost 50% of the studies. Randomised Control Trial (RCT) as a technique reduces the possibility of selection bias in a great extent and measure the effect of an intervention as accurately as possible (Mathew, 2015). Randomized controlled trials (RCTs) are considered the gold standard approach for estimating the effects of treatments, interventions, and exposures (hereafter referred to as treatments) on outcomes. Random treatment allocation ensures that treatment status will not be confounded with either measured or unmeasured baseline characteristics. Therefore, the effect of treatment on outcomes can be estimated by comparing outcomes directly between treated and untreated subjects (Greenland, Pearl, & Robins, 1999). Even if the RCT as a gold standard to measure the effect of an intervention, only in 14% of studies, the

design had been used. Interestingly, the research studies with RCT design had elicited a very small effect size irrespective of any regional factors.

Second to RCT, PSM, is a balancing score conditional on the propensity score, the distribution of observed baseline covariates is similar between treated and untreated subjects. Thus, just as randomization will, on average, result in both measured and unmeasured covariates being balanced between treatment groups, so conditioning on the propensity score will, on average, result in *measured* baseline covariates being balanced between treatment groups. (Austin, Mamdani, Stukel, Anderson, & Tu, 2005). This balancing act creates an ideal situation to compare the two groups and gives a right measure to see the effect of an intervention by controlling all confounding variables. The theoretical underpinnings of PSM have a strong practical implication in measuring the effect of teacher training program, but it had been used in 7% of the meta-analysis studies notwithstanding of its all advantages.

Therefore, the discussion around the issues of RCT and PSM as good design in the field of quantitative measurement of an intervention and at the same time less usage of this design in the studies that had been conducted with the purpose of quantitative measurement of effect size, has led to an antagonistic debate which needs further analysis of the studies with respect to its context, rationale and need of quantitative measurement of in-service teacher training program in future.

Discussion of results pertaining to research question -3

The results pertaining to the question i.e “How the effect size of in-service teacher training of a study is relational to its research Design” revealed a pattern of relationship between the chosen research design and degree of effect size of an in-service teacher training program.

It was found that the studies with the pre-post design were reported to have high effect size on the performance of teachers irrespective of any geographical barriers. The observation pertaining to this trend was consistent with all the studies having pre-post-test design in all South Asian countries with variation of effect size from 0.70 to 0.81. Paradox to this above trend, the studies with the research design of RCT and PSM, which considered as gold standard of measuring the effect of an intervention produced the effect size from 0.01(no effect) to 0.31(very small effect).

Therefore, such kind of trend leaves a caveat in attributing the performance of teachers to the mere effect of in-service teacher training program.

Educational Implications:

The study has educational implication for new researchers, the planners of in-service teacher training program, policy makers, the resource persons and monitoring and evaluation officials.

Implication for new Researchers:

The study opened a wide filed of investigation for the new researchers to further investigate the contextual factors that affecting the in-service teacher education programme.

Implication for planners of RMSA in-service teacher training programme:

A successful program always requires a practicable and effective plan. In this context, the current study analysed the various domains of in-service teacher training programme. The meta-analysis findings clearly defined the different ways and approaches of in-service training in different countries. Such kind of analysis will be helpful for the planners of in-service programme to understand the new concerns of in-service training programme and in the meantime, they can understand the new developments in secondary in-service teaching related to new pedagogic approach, evaluation technique and feedback mechanism.

Implication for Policy makers:

The execution of the RMSA in-service teacher training program is guided by some policies formulated at state and central level. These policies control the delivery mechanism, mode of implementation and follow up procedure of the training programme. In this context, the present study provides a detailed description on how the concerned stakeholders perceive the in-service training programme, what leads to an effective training program and what happens to the performance of teachers if they are oriented with evolving orienting strategy, how the follow-up activities can improve the performance of teachers etc. Therefore, this study will help the policy makers to understand the need of in-service teacher training programme and formulate the policy accordingly.

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