



Relevance of Need Assessment: Study on Enhancing Mathematical Skills of Economics Teachers at Higher Secondary Stage

KEYWORDS

Needs assessment, Refresher course, Training, Mathematical skills

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ABSTRACT *This need assessment study sought to examine what teachers at higher secondary stage express as their perceived needs for enhancing mathematical skills among the learners, to what extent participants expect these needs to be met and identifies the barriers to transfer of learning. The present paper reports the background, methodology and results of a recently conducted Needs Assessment Study as part of the proposed programme Refresher Course on Application of Mathematics in Economics at NCERT, New Delhi. Majority of teachers agreed for the introduction of mathematics in economics theories at higher secondary stage to be desirable. However, notwithstanding the above position, it was also shown that they were facing challenges while transacting the economic theory using mathematical expressions. The findings are discussed with far reaching implications and recommendations on conducting need analysis to improve the training programmes.*

Introduction:

Training activities are organised by institutions or individuals within an institution, which are initiated on the basis of problems or keeping in view the identified training needs. The demand side training needs are systematically assessed through interaction with the teachers and the feedback provided by the supervisors. Need Assessment Studies (NAS) spearhead the development of the training package/courses. Conducting of a need analysis helps in diagnosing individual problems; provide a solid base of information regarding the current capacities, strengths and weaknesses of the potential participants. The results of a needs assessment will guide subsequent decisions—including the design, implementation, and evaluation of projects and programs that will lead to achieving desired results (Watkins, West, and Visser, 2012, p. 5). Though the findings and learning of NAS are *prima facie* specific to the context of the particular programme(s) under consideration, sharing of insights from such inquiries are equally important as it provides valuable inputs for designing similar studies in future (Remesh, 2013).

In this backdrop, this paper begins with an overview of the training and how the needs assessment fits into this process, followed by an in-depth look at the results of the needs assessment study and its implications. As in most areas of education, there has been intense debate about the definition, purpose, validity, and methods of needs assessment (Stufflebeam, McCormick, Brinkerhoff and Nelson, 1985). Organizations that develop and implement training/courses without carrying out the needs assessment run the risk of overdoing training, doing too little training or missing the point completely. NAS are generally conducted when the faculty members of a particular discipline or school intend to launch an academic programme based on their specialised expertise and/or in response to a felt (otherwise established) need for commencing such an initiative [STRIDE-IGNOU, (2006)].

Background and Purpose of the Study:

The class XII Economics textbooks, *Introductory Microeconomics* and *Introductory Macroeconomics*, prepared by National Council of Educational Research & Training

(NCERT) on the basis of the recommendations of National Curriculum Framework (NCF), 2005 have incorporated the recent developments in the theory aided by a mathematical treatment of the issues involved. Mathematical methods can be used to express the economics relations with high degree of clarity and rigor. But all the same, there is variety of challenges faced by students as well as teachers while using mathematics at the introductory level which includes, low level of confidence with respect to mathematical ability, limited fluency in algebra, limited understanding of the usefulness of mathematical principles in economic argument and difficulties in recognising the mathematical representation of a problem within economic theory (Raveendran, 2010). The results of the study conducted by the Department of Education in Social Sciences to identify the problems of students and teachers while handling the present textbooks, showed a dire need for equipping the teachers (Raveendran, 2009). Pradhan (2013) also stressed that NCERT may be resorted to enhance the preparedness of teachers through organization of workshop(s) on application of mathematics in economics. Taking into consideration the demand for the course, NCERT decided to conduct a refresher course for enhancing the mathematical skills of the teachers and a programme proposal was submitted for conducting Refresher Course on Application of Mathematics in Economics for post graduate teachers/lecturers in economics. The objectives of the course were to

- (i) equip teachers to deal with the mathematical expressions used in the economics textbooks at higher secondary stage,
- (ii) help the teachers (and eventually the learners) to overcome the uneasiness in using mathematical and statistical tools in teaching and learning economics,
- (iii) caution the teachers about the over use and abuse of quantitative tools and concepts in the teaching and learning of economics, thereby orienting them to judiciously adopt the tools from mathematics and statistics in teaching economics,

The Academic Committee, NCERT recommended for con-

ducting NAS to look into the relevance and viability of the course and accorded its 'conditional approval' to the refresher course, subject to supportive results from the NAS. Subsequently, a need assessment study was conducted for understanding the perceived need for enhancing mathematical skills of teachers at higher secondary stage before the commencement of the Refresher Course on 'Application of Mathematics in Economics'. The study was carried out for identifying the concerns of teachers, their perception regarding the use of mathematical expressions in economics, assessing the requirement of the proposed refresher course as well as for finalising the content area of the course. The need assessment helped to identify barriers to transfer of learning and factors that might prevent the course from having any impact at all.

Methodology

The study used a detailed questionnaire which dwelt on teachers' perception of the relevance of the course and their expectations. It was designed to understand the scope for enhancing the relevance of the refresher course in terms of course design, content and mode of delivery. The questionnaire was validated by experts who corrected the items for appropriateness and confirmed its suitability for the purpose of this study. It was sent to various state education departments and organisations with a request for disseminating it among the teachers teaching at higher secondary stage. Some of the state education departments cooperated with this venture by issuing circulars to the schools to get the questionnaires duly filled by the respective teachers and also placed the questionnaires on their websites for wider dissemination. The survey received 158 valid responses through e-mail and post from various parts of the country.

The main findings of the study are presented in the following sections.

Findings of the study:

• Relevance of the course/training :

Training is often seen as the solution to all capacity problems; even though there are many situations training alone cannot improve (UN-Habitat, 2012). This necessitates to look into potential participants views on whether conducting of such course/training will enhance their existing knowledge, skills or attitudes.

The results of the needs assessment emphasize the relevance and need of initiating the proposed Refresher course at NCERT. The need analysis also provide information regarding who needs training and what type of training. Even though lack of confidence among teachers in handling mathematical expressions have been identified (through interactions with teachers) as a problem hindering the classroom transaction, face to face training necessarily need not be the solution. Teachers can also be enriched through supplementary materials. Therefore the organisers before proceeding have to get an idea regarding the requirement of the teachers. The study results showed that majority of the teachers (93.67 percent) were in favour of getting them trained through face to face mode in using mathematical expressions to explain economic theories. Less than five percent potential participants of the course preferred supplementary reading material to enhance their mathematical skills. Several of the respondents pointed out that initiation of such course will be well in accordance with the role of NCERT and suggested for conduct of such courses every year.

• Assessing needs and capacities:

Regarding the question on whether the teachers will be interested in attending the refresher course, almost 80 percent of them had positively responded. Some of them responded that it is not required either as they already know it or because they do not want mathematical expressions to be used to explain economic theories at higher secondary stage. However, it is felt that this course on basic skills should be made compulsory as many who need the training may not sign up, if it is voluntary either because they feel they don't need it or because they don't want to admit that they need it. Those who are already good at the mathematical skills can still benefit from the course, and they can also help to train the others.

• Specifying Training Needs:

The respondents intended to join the course for updating subject knowledge and as they felt that it is designed specifically for enhancing mathematical skills. Majority of them (82.28 percent) were of the view that the course will enhance their ability to transact the subject in the better manner.

• Course objectives, design and content :

Needs and objectives are prime factors when determining subject content [Kirkpatrick and James D. Kirkpatrick, 2009, p.9]. The course content is to be prepared to meet the needs and achieve the objectives of the course. The answers of the potential participants help in ascertaining the topics to be covered or deleted. The respondents generally welcomed the incorporation of practical sessions and the integrated design of the course. It was viewed that the practical sessions should cover more application based questions.

• Schedule of the course:

The best schedule takes three things into consideration: the trainees, their bosses, and the best conditions for learning (Kirkpatrick et al, 2009, p.11). Recently, NCERT organised a three week-long refresher course for teachers in the month of November 2014. Neither the teachers nor the institutions were ready to spare this much of time during the midsession. Since the programme proposal approved was for three weeks duration, it was binding over the coordinator to conduct the course with the same duration. The need assessment analysis show that majority of the teachers were keen to attend courses for a shorter duration. Around 80 percent of the respondents preferred two week long course only and none of them preferred a twenty one day course. The respondents preferred the months April to June, which is mainly the start of the session followed by vacation. Taking into consideration the needs and preferences of the potential participants as well as their respective institutions is quite necessary for ensuring teacher's participation in the course.

• Topics to be covered in the future training programs:

The overall structure of the refresher course as well as the content was mostly found adequate and effective by the respondents. There were also suggestions to give more coverage to areas such as hyperbola, derivatives of trigonometry, probability, vectors, matrices, integration and so on. The practical sessions were recommended to be supplemented by situation analysis.

Discussion and Implications:

The need assessment results clearly point out the need for conduct of the refresher course on 'Application of Mathematics in Economics'. The information gathered for de-

termining whether training is an appropriate approach also shows a positive response. When training is decided upon as the best way to enhancing the mathematical skills, the requirement of training needs is essential for identifying the potential participants, the objective of the training and mode and duration of training. This information helps the organiser to develop and structure the course so that it is relevant both to the individual participants and their respective institutions.

The practical problems, observations and constraints, stated by the potential participants help in adequately designing the course and mode of delivery so as to maximise the impact of the course. As the teachers find it difficult to attend refresher course of longer duration it can be designed in such a way that face to face training, it could be for a shorter period of two weeks followed by online training. Even though the NCERT, (State Council of Educational Research and Training) SCERTs, Navodaya Vidyalaya Samiti (NVS), Kendriya Vidyalaya Sangathan (KVS) and other organizations regularly organise gamut of training programmes, most of the potential participants had not attended any on the specific area. All training programs/courses needs to be communicated to the concerned Department in advance so that the participants could choose the appropriate programs and attend with effective preparation. The course design that included practical sessions were accepted as it helped them learn better. They suggested for practical sessions, supplemented by situation analysis.

The findings of the NAS seem to have reiterated the suitability of the refresher course for the lectures/post graduate teachers at higher secondary stage in dealing with problems and issues confronting them while transacting economic theory using mathematical expressions. NAS was very effective in establishing the relevance and viability of the proposed refresher course, strengthening the course design and content and in collating the views of stake holders with respect to the use of mathematical expressions to explain economic theories at higher secondary stage.

Limitations of the study:

The need analysis was based only on questionnaire responses. The questionnaire makes little provision for free response and at times do not effectively get at causes of problems or possible solutions. The study had helped in determining the commitment of the potential participant of the course towards the desired capacity building. However, the institution or the organisational support in this regard was not assessed. Their willingness and commitment to depute the teachers for the course is very much essential. Support is also required for enabling the trainees in implementing what they have learned. Due to the non involvement of the administrators of the respective institutions in the need assessment study, their response regarding the conduct and feasibility of the course could not be assessed. It would have helped in making them aware of the changes that are necessary and the relevance of the course in contributing to achieving the necessary changes.

Conclusion:

The refresher courses apart from serving teachers in keeping themselves abreast for the latest advances in the subject area also provide opportunities for them to exchange experience with their peers and to mutually learn from each other. Teachers being the main gate keepers for effecting an integration of mathematics in economic theory, needs to be equipped through adequate training. Participants in the need assessment study indicated the relevance of the course and the need to expand the course offerings. The study provided a solid framework for the organisers in identifying gaps or discrepancies with respect to the mathematical skills, to prepare the course design and content and also take note of the problems that may not be solved by training. In addition, needs analysis also serves as basis of comparison for evaluating the effectiveness of the course. Considering the expenses involved in executing training programs, it is logical to analyze training needs at the onset, so that it can be made to order focusing on precise needs. The documentation and dissemination of findings of need analysis becomes useful in sharing replicable lessons and realistic pictures.

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