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Research Note

Effectiveness of Training on Concept Building in Statistical Tools for Fishery Professionals

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Statistics is a collection of methods applied for planning, designing, data collection, analysis and meaningful data interpretation that subsequently facilitate prudent decision-making for inland fisheries. It helps in making rational and correct decisions in the face of variability and uncertainty (Bhujel, 2008). In fisheries science, where the information is both limited and variable, statistical tools are indispensable. Acquiring skills on statistical analysis forms an essential component of every discipline, especially in fisheries science where uncertainty invariably occurs in data. Therefore capacity building on data collection, fisheries statistics and prudent application of statistical tools is of high priority (de Graff et al., 2015). There is a need to extend the knowledge and build the capacity of researchers for statistical data collection, analysis and utilization of scientific data for prudent decision-making in inland fisheries, which ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI) has developed over the years. Contemplating such needs, ICAR-CIFRI organized training on 'Concept building in basic statistical analysis for inland fisheries management' during 3-10 August, 2018 at Barrackpore, Kolkata, India. The main objectives of this programme were to (i) introduce the nature of data evolved in inland open-water fisheries research, (ii) strengthen the knowledge and concept in basic statistical tools and techniques for analysis of data relevant to inland fisheries, and (iii) to get acquainted with statistical software for data analysis. The training was attended by 20 participants from the West Bengal University of Animal and Fishery Sciences, Kolkata and ICAR-CIFRI staff members.

In any capacity building programme, it is essential to evaluate whether the programmes have made any improvement on knowledge level of the participants since it involves a considerable amount of money and time (Nedunchezhiyan et al., 2010). Numerous components are involved in the process of training and need to be critically analysed for their appropriateness (Lambe et al., 2011). Several studies have been conducted for assessing the effectiveness of training on participants' knowledge gain on various farming techniques in agriculture and allied sectors (Nedunchezhiyan et al., 2010; Lambe et al., 2011; Hundal et al., 2016; Kaur, 2016; Roy et al., 2018; Aiswarya et al., 2019). However, direct assessment of learning in statistical skills, based on pre- and post-tests, is limited (Bridges et al., 1998; Price & Randall 2008; Delucchi, 2014; Benn et al., 2017). The effectiveness of training courses on statistics in agriculture as a whole and fisheries in particular remains to be determined in India. In the present study, we attempted to carry out an analysis with the participant-trainees of the training on basic statistical analysis for inland fisheries management to assess their knowledge gain and satisfaction over different aspects of training.

We used one-group pre and post-test design for this study. In this design, a single group of research participants is measured on the dependent variable both prior to and after the administration of the treatment condition (Christensen et al., 2014; Fraenkel et al., 2012). The training on basic statistical analysis

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was taken as the independent variable, while the learning or knowledge gain by the participants in basic statistical concepts was taken as the dependent variable. The training was evaluated in terms of knowledge gain by participants and their satisfaction over the various training components (e.g., coverage of course content, duration of training, effectiveness of discussions, etc.). The knowledge gained by the participants was assessed by subjecting the participants through knowledge test with moderate difficulty index before and after the training. The test consisted of 25 multiple-choice questions (MCQs) based on descriptive and inferential statistics to be covered in the training. Each correct and wrong answer was assigned a score of 1 and 0, respectively and there was no negative score for any question. Knowledge gain was coded by subtracting the percentage of correct answers that participants obtained before the training from the percentage correct after the training (Delucchi, 2014). The trainees were further categorized into three groups on the basis of their knowledge score, namely, low (<Mean–1 SD), medium (Mean±1 SD), and high (>Mean±1 SD) using confidence interval method (Lambe et al., 2011; Raj & Angadi, 2011).

The satisfaction of participants over the conduct of training programme was measured in different components like confidence gained in basic statistics before and after the course, course instructors behavior and style, quality of presentations/lectures, course content coverage, effectiveness of discussion, hands-on practical sessions, duration of course and training overall on a five point rating scale ranging from 1 to 5 (Very low=1 to Very high=5).

Descriptive statistics like frequency, percentage, mean, median, inter-quartiles ranges (IQRs) and ranks were calculated for a comparison before and after the training; the test of significance (paired 't'-test) was used to find if there were significant differences between the knowledge gain of participants before and after the training. All the data were analysed by using Statistical Package for the Social Sciences Software (SPSS, version 21.0).

In the present study, 20 participants comprising 9 (45%) females and 11 (55%) males were enrolled. All the participants completed the before-after training-related evaluation. The median scores (percentages of correct responses), maximum and minimum scores before and after the training were depicted in Fig. 1. A paired-sample 't' test showed a statistically significant difference between the mean score of participants before and after the training program ($t_{(19)}$=14.97, df=19, p<0.001). The overall mean knowledge score of participants before the training was 38.2, which is significantly low as compared to the mean score of 64.6 after the training. This difference between mean scores before and after the training equals 26.4%, which was better in this study than the previous evaluations of learning in social statistics (20.9%) (Delucchi, 2014). Given the significant paired-sample 't' test, we conclude that participants' concept building in basic statistical knowledge related to fisheries dataset has been substantially improved after attending the training program. The classification of participants based on their knowledge score into three categories, namely, low, medium and high with the confidence interval method was depicted in Fig. 2. Before attending the training program, the levels of knowledge were low in 30%, medium in 55% and high in 15% of the participants. However after attending the training program, the levels of knowledge were medium and high in 70 and 30% of participants, respectively. The results showed that the proportion of participants in medium and high knowledge level increased significantly by 15% each after attending the training. It was noteworthy that the knowledge level in none of the participants was classified as low after training. The majority of the participants in medium knowledge level even during before training evaluation indicated that participants possessed moderately good knowledge on basic statistical analysis before coming to the training. This is probably due to their previous

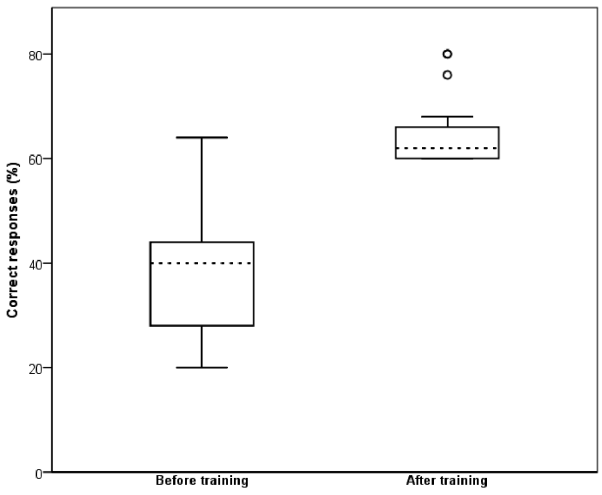

Fig. 1. Knowledge score of participants before and after the training (n=20)

exposure to statistics courses during their academic programmes. The percentage of knowledge gained was better in this study as compared to the previous evaluations of summer school on rice mechanization (42.5%) (Kumar et al., 2005) and winter school on tuber crops (58.6%) (Nedunchezhiyan et al., 2010).

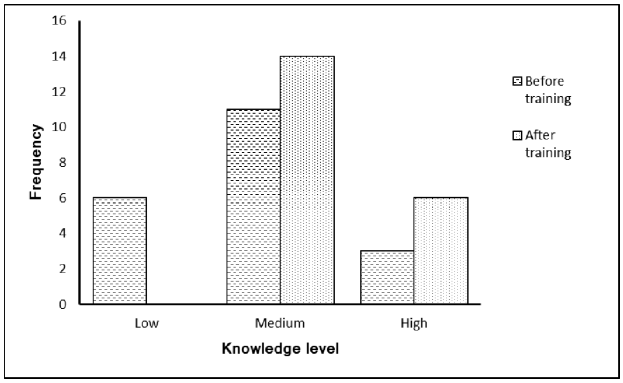

Fig. 2. Classification of participants based on their knowledge score (n=20)

The satisfaction of participants on training program was evaluated using end-of-course feedback sheet with respect to different training components. Statistical measure of median and Inter-quartile range (IQR) corresponding to each component are shown in Fig. 3. The median score for participants' confidence level (on a 5-point rating scale) was 2 prior to their participation in the training, which increased to a median of 3.5, indicating considerable gain in their ability to use prudent statistical tools. This finding is in line with the previous study conducted for increasing statistical competency of junior investigators in academic medicine which revealed considerable gains in median confidence level from 2 to 4 after participation (Benn et al., 2017). Median (IQR) score for relevance of training was 4 (4-5). Most of the participants (64%) perceived that the course contents on which training provided to them was highly relevant to their job requirement. Almost 86% participants perceived that both the course instructors and quality of presentations/ lectures were highly useful with a median (IQR) score of 5 (4–5). The participants (62%) were also highly satisfied with the course content and effective discussions-with median (IQR) of 4 (4-5). However, the majority of participants (73%) thought that 8-days training course was not enough. Median (IQR) hands-on practical session was 3 (3-4). Median (IQR) overall satisfaction with the training was 4 (4-5). Most of the trainees expressed high level of satisfaction from the training in terms of overall

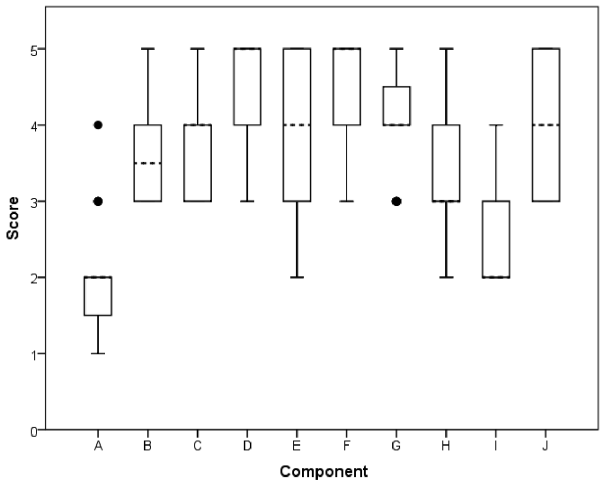

Fig. 3. Particiants' satisfaction on the different aspects of training. Boxes and dotted lines represent IQRs and medians, respectively. Dots represent outliers (each dot represents at least one response)

Note: (A- Confidence in your ability to use statistical tools before training, B- Confidence in your ability to use statistical tools after training, C- Relevance of training to your job requirement, D- Course instructors, E- Effectiveness of discussions, F- Quality of presentations/ lectures, G- Course content coverage, H- Hands-on practical session, I- Duration of course and J- overall opinion)

training facilities, course instructors, quality of lectures, course content and effectiveness of discussion. In fact, they all indicated that they would like to attend more such trainings and recommend it to their colleagues.

The study suggested that the training provided to the participants had improved their knowledge in relation to statistical tools. The participants were satisfied with the format and contents of the course except hands-on practical sessions and course duration. The future training programmes may be improved by increasing duration of course and hands-on practical sessions preferably with one or two statistical software, as suggested by the participants. There is a need to assess the ex-post-facto study of this training programme in terms of adoption of different statistical tools for inland fisheries management and their statistical capability in handling real life situation.

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References

Aiswarya, S., Wason, M., Padaria, R. N., Rao, D. U. M., Gills, R., Priyadarshini, P. and Gurung, B. (2019) Assessing the level of effectiveness of training programmes for enhancing core competencies of extension personnel: An analytical study in Kerala. Indian Res. J. Ext. Edu. 19 (1): 73-76

Benn, E. K. T., Tu, C., Palermo, A. S., Borrell, L. N., Kiernan, M., Sandre, M. and Bagiella, E. (2017) The ASIBS Short Course: A unique strategy for increasing statistical competency of junior investigators in academic medicine. J. Clin. Transl. Sci. 1(4): 235-239

Bhujel, R. C. (2008) Statistics for aquaculture. Wiley-Blackwell, USA. 240p

Bridges, G. S., Gerald, M. G., Jana, L. P. and Kristin, A. B. (1998) Teaching quantitative research methods: A quasi-experimental analysis. Teach. Sociol. 26(1): 14-24

Christensen, L. B., Johnson, B. and Turner, L. A. (2014) Research methods, design, and analysis, 12th edn., Boston: Pearson

de Graaf, G. J., Nunoo, F., Ofori, D., P., Wiafe, G., Lamptey, E. and Bannerman, P. (2015) International training course in fisheries statistics and data collection. FAO, Rome, FAO Fisheries and Aquaculture Circular No. 1091, 134p

Delucchi, M. (2014) Measuring student learning in Social Statistics: A pretest-posttest study of knowledge gain. Teach. Sociol. 42(3): 231-239

Fraenkel, J., Wallen, N. and Hyun, H. (2012) How to design and evaluate research in education, 8th edn., New York: McGraw-Hill

Hundal, J. S., Singh, U., Singh, N., Kansal, S. K. and Bhatti, J. S. (2016) Impact of training on knowledge level of goat farmers in Punjab. Haryana Vet. 55(1): 47-49

Kaur, K. (2016) Impact of training course on knowledge gain of mushroom trainees. J. Krishi Vigyan. 4(2): 54-57

Kumar, N., Rautaray, S. K., Gupta, M. and Singh, K. (2005) Impact of summer school on mechanisation of rice production system. Indian J. Ext. Educ. 41(1&2): 54-57

Lambe, S. P., Kulkarni, S. Y. and More, S.D. (2011) Effectiveness of Training Programmes Organized at Selected Training Institute. IJEMR. 1(1): 49-52

Nedunchezhiyan, M., Anantharaman, M. and Sivakumar, P. S. (2010) Effectiveness of a winter school on quality planting material production of tropical tuber crops. J. Root Crops. 36(1): 95-99

Price, B. A. and Randall, C. H. (2008) Assessing Learning Outcomes in Quantitative Courses: Using Embedded Questions for Direct Assessment. J. Educ. Bus. 83(5): 288-294

Raj, C. P. and Angadi M. (2011) Hospital-based KAP study on diabetes in Bijapur, Karnataka. Indian J. Med. Specialities. 1(2): 80-83

Roy, A., Das, B. K., Chandra, G., Das, A. K. and Raman, R. K. (2018) Knowledge and skill development of Bihar farmers on inland fisheries management: A terminal evaluation. Indian J. Fish. 65(2): 119-123