A STUDY IN EQUIPMENT UTILISATION AND MAINTENANCE IN POLYTECHNICS (GUJARAT STATE) - INDIA

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ABSTRACT

This condensed paper is taken from the dissertation of the author presented to the Bhopal University, Bhopal, of the State of Madhya Pradesh, India in fulfilment for the award of Master in Technical Education, March, 1987. This paper tries to quantify the use of laboratory and laboratory equipments to assess their effectiveness and efficiency in the technical education system. It is not the economic factor but the time factor which has been considered in this study. The results of the study reveal that there is ample room for improvement in many areas of laboratory utilisation and hence consistent with the hypotheses.

1.0 Presentation of the Problem :

Polytechnic laboratories (for that matter laboratories in general) are areas where a huge investment is made in comparison to the resources provided for classroom instruction. In a world where science and technology is developing in leaps and strides one needs continuously to improve and re-organise the polytechnic laboratories and laboratory equipments to confront the changing demands of the industry and educational environment. Moreover, the Director of Technical Education, Gujarat State (India) considered the polytechnic laboratories a priority area for a research study to be undertaken so as to ascertain to what extent the polytechnics of Gujarat State are utilising and maintaining the laboratories and equipments therein.

The purpose of this study was to determine the current level of utilisation of laboratory and laboratory equipments in relation to maximum possible utilisation and also to determine the quality of

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utilisation of the available equipment. Other considerations of this study were to identify the problems which adversely affect the utilisation of the equipments - more specifically the problems of maintenance, to assess the extent of the availability of equipment vis-a-vis curriculum objectives and to determine ways in which the utilisation of laboratories could be improved.

2.0 Procedures utilized in the Study :

The population of the study consisted of all the Government polytechnics in Gujarat State established upto 1982 producing middle level supervisory technical manpower and offering conventional diploma programmes in Civil, Electrical and Mechanical Engineering. To collect information, which was very descriptive, a survey research was carried out through mailed questionnaires followed by interviews.

All the ten Government polytechnics offering conventional diploma programmes were taken as the sample for mailing the questionnaires and interviews were undertaken in three of the ten polytechnics.

The data received were analysed based on the basis of the various hypotheses which were evolved from the objectives. The averages and percentages of various dichotomous items were derived and the results obtained for most of the hypotheses. The Laboratory Utilisation Factor (L.U.F.) and the Equipment Utilisation Factor - Quantitative (E.U.F. - Quantitative) were found out based on formulae which were derived for the purpose of this study. Where,

$$\text{L.U.F.} = \frac{\text{Actual No. of Students using the lab./year} \times \text{Actual No. of hours the students use/year.}}{\text{Maximum No. of students who can use the lab./year.} \times \text{Maximum No. of hours the lab. is available/year.}}$$

$$\text{E.U.F.} = \frac{\text{Minimum No. of students required to use the equipment as per norms} \times \text{Actual No. of hours the equipment is to be used by the students per year.}}{\text{Actual No. of students using the equipment.equipment is to be used by the students as envisaged in the curriculum.} \times \text{Minimum No. of hours the}}$$

were gathered through the questionnaires and interviews.

3.0 Results and Discussion

Ten main hypotheses were evaluated with the help of the data that

Laboratory Utilisation Factor (L.U.F.) & Equipment Utilisation Factor (E.U.F. - Quantitative.)

Table I and Table II summarise the

results and shows that the hypotheses were confirmed in that the L.U.F. of the laboratories and the Equipment Utilisation Factor (E.U.F.) - Quantitative are below 25 per cent and 50 per cent respectively.

TABLE - I

LABORATORY UTILISATION FACTOR (L.U.F.)

Poly. Lab.	L1 (%)	L2 (%)	L3 (%)
P1	17.4	3.1	19.4
P2	3.2	2.7	--
P3	4.2	2.4	--
P4	2.4	--	--
P5	3.7	11.8	5.4

TABLE II

AVERAGE E.U.F. - QUANTITATIVE

Poly. Lab.	L1 (%)	L2 (%)	L3 (%)
P1	1.4	19.8	13.3
P2	6.7	29.6	7.5
P3	4.9	6.4	6.0
P4	3.8	21.6	12.7
P5	4.0	36.6	6.4

Poly = Polytechnic
Lab. = Laboratory
L1, L2, L3 = Civil, Mechanical, Electrical Lab.

The hypotheses on Level of Utilisation and Level of Maintenance were also confirmed. It was seen that experiments with lower level learning outcomes were performed more than experiments with higher level learning outcomes and that no preventive maintenance was undertaken respectively.

The main reason for non-operation of equipments was low relevance to curriculum, thus confirming the hypotheses.

Excepting for two, all the laboratories were short of the equipments that are envisaged in the curriculum thus confirming the hypotheses.

8 out of 10 polytechnics reported that one of the needs of the polytechnics was that the supporting staff required training in operation and maintenance of the equipments.

The hypotheses on the obsolescence of the equipment was accepted with a 'pinch of salt', as only 6 equipments were reported to be obsolete wereas on interview it was confirmed that many equipments are obsolete though they are in working condition.

The hypothesis on equipment breakdown was rejected because it is seen that there are equipments which are not operational for years together.

The hypothesis on lab. ergonomics was also accepted because availability of space, light, water and gas were sufficient in the majority of the labs.

4.0 Summary :

Alternative methods of time-tabling, keeping the number of students to the optimum size compatible with the expected learning are some of the ways of improving the L.U.F. & E.U.F. - Quantitative.

Increasing the number of experiments of higher learning value like discovery type, problem solving type, investigation type etc. would be more desirable.

Preparation and implementation of maintenance schedules and setting up a central team specialized in maintenance of laboratory equipments could be a step towards better maintenance and upkeep of laboratories.

Yearly fund allocation for purchase of relevant equipment needed for the laboratories and training the supporting staff in operation and maintenance of the equipment will go a long way in enhanced laboratory utilisation and maintenance.

Such research could further be undertaken for the polytechnic laboratories of other States of India and in the institute of higher learning too.

5.0 References :

1. BALU S.A. - Monitoring & Evaluation of Material Resources - paper presented at the Fourth Indian Country Course in Resource Management - January 1983 - pp. 1-10.

2. LOCKEY J. - A simple Cost Effectiveness Study of an Advanced Teaching Laboratory - A paper (1975) - pp. 1-7.

3. NIGAM C.K. - A Critical Survey of facilities for modern Science Teaching with emphasis on effective laboratory utilisation in the tribal Higher Secondary Schools of Dhar, Jhabua, West Nimar, Khandwa and Ratlam districts of Madhya Pradesh - M. Ed. dissertation submitted to Vikram University, Ujjain from Regional Colleges of Education, Bhopal (1970) - pp. 8-200.

4. SAXENA S.C. - Equipment Utilisation in Technical Institutions - A paper in Short Course on Resources Management in Polytechnics, TTTI Bhopal (1981) - pp. 1-4.

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Youth is the season of hope, enterprise and energy to a nation as well as an individual - **W. R. Willaims.**

Life is easier than you think
All you have to do is accept
the impossible, do without the indispensable
And bear the intolerable.