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An Ameliorating Study on Medical Technology Teachers' Efficacy

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Abstract

Aim: The research aims at identifying, categorize the factors that play an important role in improving the teachers' effectiveness, and study the response pattern of the feedback from paramedical students at an Indian private health sciences institute.

Designs Settings: The research design is descriptive and exploratory in nature. A self-administered questionnaire is prepared based on the literature review; the content validity and the internal consistency was ensured; the mean scores for the activities were calculated

Study carried out on 103 students of medical technology program with specializations in cardiac care, dialysis, respiratory therapy, imaging sciences, clinical laboratory, operation theater and anesthesia technology.

Materials and Methods: Survey was conducted to ascertain the effectiveness of teachers for the medical technology courses of SIHS. The study investigates effect of variables such as sex, professional competency & influence of superseding variables on teaching.

Statistical Analysis: Data was analyzed using SPSS Inc. Version 16.0; mean values were calculated for the four variables of study i.e., execution of instruction (EI), interpersonal relations (IR), classroom management (CM) & planning of instructions (PI). Independent t test comparison was conducted for execution of instruction of male and female students. On obtaining significant results, linear multiple regression was implemented to assess the ability of three measurement parameters i.e., interpersonal relations, planning for instructions and classroom management to predict scores for execution of instructions rated by the students of medical technology. Results: The prime factors influencing teachers effectiveness emerged as interpersonal relationship (beta = .57, $p < .001$) followed by the planning for instructions (beta = .20, $p < .001$) and classroom management (beta = .14, $p < .001$).

Conclusion: It is critical to understand and address the factors affecting the medical technology education system and assess the effectiveness of teachers imparting the education in order to create a better & adaptable medical technologist

Keywords: Teachers effectiveness, feedback system, influential factors, medical technology, allied healthcare programs

Introduction

There are very few universities and institutes in India running education programs for allied healthcare professionals. There is huge enrollment of students into the allied healthcare programs. Studies have revealed factors like personal & social influence, academic

excellence, career opportunity, individual aspiration and self-efficacy determine the enrollment of students in the allied healthcare programs(1). At present there are vast variety of allied healthcare professionals in India like medical laboratory technology(2), imaging, ophthalmic, OT and anesthesia technologist, cardiac care, dialysis, respiratory therapists, speech therapists and audiologists and neuro science technologist (3).These technologist must be trained with competencies of career and updated with the new advancements and changes in the medical technology(4). Innovations and sophisticated medical technology lays emphasis on the significance of these medical technologists in the healthcare industry. Working under the supervision of medical doctor and departmental manager, medical technologist play an important role in performing different diagnosis operations/test & generates the report for the doctor & patients thereby providing effective healthcare solution to the doctors & patients(5).

Competency based curriculum & the teaching learning process at the universities imparting job skills and develop professional abilities to the medical technologists must set up their higher standards of training(4). Important component of a competency based learning model is to have work based test/evaluation, continuous formative feedback system, active participation of the learner in the education process and fortifying rigorous curriculum development, faculty development and assessment process. Hence it is imperative that the critical skills needed of the learner which includes self-directed and lifelong learning, self-reflection, and self- evaluation, can only be assessed through a rigorous analysis of frequent formative feedback responses.(6)

Significance of Effective Teaching

Study on medical technology teachers' teaching quality decides the improvement of knowledge and thinking related ability of a student. Study shows high technology, ICT based learning is more efficacious in comparison to conventional classroom training (7). To assess edifying efficacy, internal as well as external dimensional parameters matter. Internal dimensions include individual ability to inspire, to communicate, the individual study material and training delivery style. External factors include well organized program structure, course plan, session plan, infrastructure facilities and availability of access to the resource material(8).

Components of Teaching Effectiveness

Classroom Management

Classroom Management is an important factor that describes the process of checking that classroom teaching runs smoothly. Classroom management can be explained as the goals and actions that teachers use to create a promising learning conditions in order to improve students learning experience and ensure they complete their desired goal(9).

Good classroom management includes time management, ascertaining that the teacher sets up the class rules, act responsibly, well organized, prepared, students learning transpires as per the targets set without any deviations and group activities are managed efficiently(9).

Interpersonal Relations

Between-people relationship includes building on positive approach with the students, keeping up their interests and active student participation in the class, exhibiting concern to students problems and understanding, being good listener, counselor, negotiator, motivator and inspiring them for the learning efficaciously(9)

Planning for Instruction

This component of teaching includes showcasing of course mastery, meeting up with completion of the course within time, designing pedagogically effective session plans, development of study material, use of ICT for instructions and learning of emergent techniques & practical research. The course plan consists of stated objectives, session objectives, guided practice, modeled activities, checks for understanding, assessment scheme, feedback and reviews/closures(9).

Execution of Instruction

A very important parameter in the process of figuring out the quality of teachers' efficiency is the way instructions are delivered in the class. A good instruction delivery depends on the use of appropriate methodology by the instructor, encompassing interactive talk, making efficient use of ICT, efficient use of questions, discovering new activities for better understanding of concepts, providing guided practice, monitoring students' progress and understanding, devote appropriate time for the activities, provide feedback/debriefing to the students and revise the previously taught concepts(9)

Faculty Development

To compete with global education system and meet up the demand for new research & innovations, the aim, objectives and demands of Indian education system have changed. The teachers have a more preponderant role & responsibility to meet up with these demands and create competent professionals who would stand out with their counterparts and make the country economically independent. Hence, it is essential for the faculty to not only be dedicated, exemplary, competent and devoted but also to be effective specialists in its assigned role (9).

Although there is a demand for a well-trained faculty, the existing training programs are insufficient to meet the need. Establishing a successful faculty development program will not only refine new curricular strategies, but also transform the existing medical educational environment. Curricular and outcome analysis of the health professionals

has identified faculty development as an indicator of the failure or success of the new healthcare policy proposals.(10)

Following are the suggestive measures for faculty development:

1. Institutions must provide facilities and funding for faculty development and research

2. Evidences of trainings must be provided by the institute

3. Training must be delivered keeping in mind the individual and institutes requirements

4. Faculties must be encouraged for research activities with funding obtained from external agencies

5. Competencies must be defined for medical education faculties and they must be assessed accordingly

6. Accrediting bodies must emphasize teachers' development as per the competencies and acknowledge teachers achievements in teaching learning outcomes(11).

7. Faculty must be encouraged for creating MOOC based courses on national & international portals like swayam, swayam prabha, nptel, etc.

8. Their subject knowledge, domain specific knowledge, knowledge about andragogy, teaching methodology, their demonstration skills, task management skills, contingency management skills and work environment skills must be improved(4).

Methodology

Education investigators often advocate the use of effect sizes in sample size calculations(12). In the previous study the sample size that was used was 101(7) and 77(4).Hence, from 200 randomly selected eligible participants, 103 (96%) medical technologists agreed to participate in the study.

Study Design: Cross sectional & exploratory research, study was conducted at Symbiosis Institute of Health Sciences, Pune Maharashtra, India. The study participants included the students who are admitted to first year and second year degree course in the institute. Total 20 teaching faculty were assessed in the study.

Research Tool: Self-administered questionnaire through Google Forms. Information Data collection occurred over the course of approximately 6 weeks. Microsoft Excel and Statistical Package for the Social Sciences (SPSS) version 26.0 software's was used for the analysis and data interpretation. With the help of previously conducted research, the questionnaire was developed for the study.

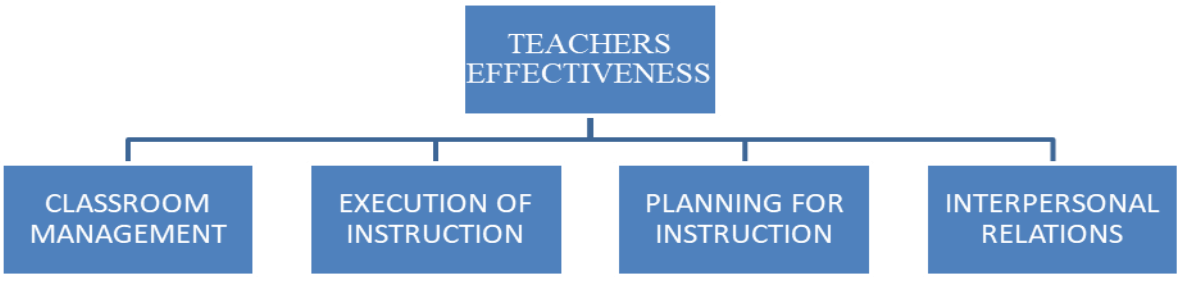

Figure 1: Pictorial representation of parameters defining teachers' effectiveness

The questionnaire was circulated among the participants through Google form application. Data was collected using the google form. The questions addressed the skills in various areas of teaching like classroom management, interpersonal relations, planning for instruction & execution of instruction (See Figure 1). All the results were given options as per linkerd scale: fully satisfactory, satisfied, neutral, dissatisfied and fully dissatisfied. The response data received from the students for all the faculty on each question were collated and expressed in percentage.

Results

Table 1: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean_EI	Equal variances assumed	1.335	.248	2.196	992	.028	.14155	.06444	.01509	.26801
	Equal variances not assumed			2.107	404.255	.036	.14155	.06719	.00945	.27364
Mean_IR	Equal variances assumed	.001	.974	2.564	992	.010	.16061	.06263	.03771	.28351
	Equal variances not assumed			2.533	424.450	.012	.16061	.06340	.03599	.28523
Mean_PI	Equal variances assumed	.446	.504	2.195	992	.028	.13795	.06285	.01461	.26129
	Equal variances not assumed			2.130	411.928	.034	.13795	.06478	.01062	.26529
Mean_CM	Equal variances assumed	.218	.641	2.166	992	.031	.14664	.06769	.01380	.27948
	Equal variances not assumed			2.099	411.061	.036	.14664	.06986	.00932	.28396

An independent t test was conducted to compare the scores for execution of instruction for male and female students. On average, males have reported better execution of instruction (M = 4.1, SE = 0.059) than females (M = 3.96, SE = .031). The difference was significant t (992) = 2.19, P < 0.05.Similarly independent t test was conducted to compare the scores for Interpersonal relationship between faculty and the students. On average, male students have reported better interpersonal relations (M = 4.08, SE = 0.055) in comparison to females (M = 3.92, SE = .031). The difference was significant t (992) = 2.56, P < 0.05. In addition to that independent t test was conducted again to compare the scores for planning for instructions rated by both male and female students. Again, on average, male students have reported better planning for instruction (M = 4.08, SE = 0.056) in comparison to females (M = 3.11, SE = .031). The difference was significant t (992) = 2.53, P < 0.05. At the end, independent t test was conducted again to compare the scores for classroom management of the faculty rated by both male and female students, On average the male students have reported better classroom management instruction (M = 4.04 , SE = 0.061) in comparison to females (M = 3.9, SE = .033). The difference was significant t (992) = 2.16, P < 0.05, See table 1.

Table 2: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.887[a]	.787	.786	.41345	.787	1239.813	3	1009	.000

a. Predictors: (Constant), Mean_CM, Mean_PI, Mean_IR
b. Dependent Variable: Mean_EI

Table 3: Coefficients Summary

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.296	.062		4.735	.000					
	Mean_IR	.585	.038	.570	15.323	.000	.877	.434	.223	.153	6.552
	Mean_PI	.209	.030	.204	6.935	.000	.816	.213	.101	.244	4.099
	Mean_CM	.141	.029	.148	4.870	.000	.809	.152	.071	.229	4.369

a. Dependent Variable: Mean_EI

Linear Multiple regression was used to assess the ability of three measures Interpersonal relations, planning for instructions and classroom management to predict scores for execution of instructions rated by the students of medical technology . Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multi-collinearity and homoscedasticity. Scores for Interpersonal relationship together with planning for instructions and classroom management were entered into the model as independent variables and execution of instructions was entered as dependent variable. The three control measures

explained 78 % of the variance in execution of instructions F (3, 1009) = 1239.81, See table 2. In the model, all the three measures were statistically significant, with the Interpersonal relations recording a highest beta value (*beta* = .57, $p < .001$) followed by the Planning for instructions (*beta* = .20, $p < .001$) and classroom management (*beta* = .14, $p < .001$), See table 3.

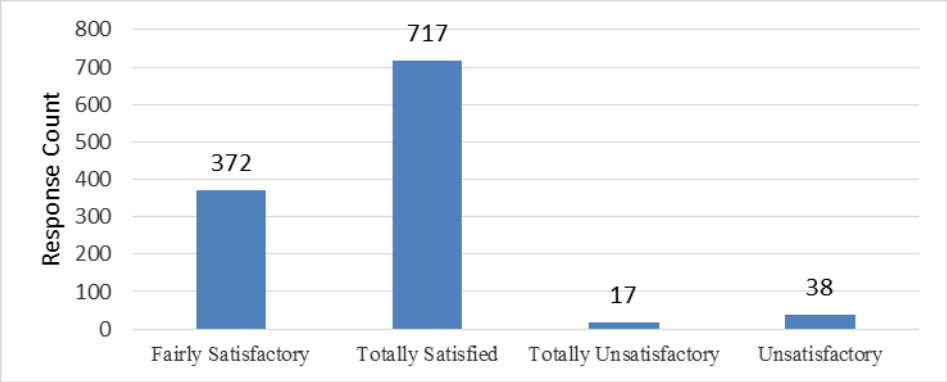

Figure 2: Student stakeholders' response on "Overall effectiveness of the faculty in the class"

Discussion:

The main purpose of the study is to examine and determine the parameters that influence the effectiveness of teaching in technology students of medical field. Prior study shows a positive correlation between lesson presentation, classroom management and questioning behaviors(13). But the study results fall short of positive outcomes in providing a guideline for rating, selecting and analyzing a teacher(13). Kirkpatrick's model gave four level of evaluating learning outcomes which are learners reaction, behavior, learnings and organizational performance(10).Learnings from this model helped in determining the correlating factors of teachers efficiency measurement i.e. execution of instruction (EI), interpersonal relations (IR), classroom management (CM) & planning of instructions (PI) in the present study. Findings of a study conducted on secondary school teachers claimed that gender, locality, personal, professional and intellectual aspects are important factors that affect teaching effectiveness.(14) This study also commensurate that gender (male/female) is a vital factor producing significant impact on teachers' effectiveness assessment. Stronge (2007)framework of effective teaching defines qualities of effective teaching as the teacher as a person, classroom management ,organizing of instruction implementing of instructions and monitoring students' progress & potential(15)(16).Considering the same qualities for the current study the assessment results showed interpersonal relationship as the most important determining aspect compared to other parameters influencing teachers effectiveness outcomes.

Conclusion

Improvement in the medical technology education is one of the priority areas for all the universities, as the students will be dealing with human lives. Teachers' effectiveness is the outcome measure to demonstrate improvement in the medical technology education delivery.

This study concludes that out of the four components of teachers effectiveness i.e. classroom management, interpersonal relations, planning for instructions and execution of instruction.

The most significant components in the descending order of priority are interpersonal relationship between faculty and student, planning for instructions and classroom management. Hence, the focus of medical technology teachers should be to develop student friendly environment by enhancing the interpersonal relationship with the students. In addition to that, the teachers should devote adequate time for planning of instructions and lastly discipline in the classroom via classroom management can yield the desired educational outcomes. Moreover, it has been found that the differences in the domains of teachers' effectiveness is affected by the gender of students as well. At the end, it can be said this study sets the priority areas for the medical technology teachers, which can be instrumented in achieving the desired educational outcomes.

Ethical Clearance Not Applicable

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Conflict of Interest: Nil

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