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FACTORS PREVENTING COMPETENCY DEVELOPMENT AMONG TEACHING FACULTY IN ARTS AND SCIENCE COLLEGES USING MULTI-DIMENSIONAL SCALING TECHNIQUE

Dr. Malathi Selvakkumar

Principal, Collegiate Education, Aachi Educational and Research Foundation, Chennai – 40, T.N, India

ABSTRACT

According to The American Commission on Teacher Education, "The quality of a nation depends upon the quality of its citizens. The quality of its citizens depends not exclusively, but in critical measure upon the quality of their education, the quality of their education depends more upon any single factor, upon the quality of their teacher".

Teachers are perhaps the most critical component of any system of education. How well they teach depends on motivation, qualification, experience, training, aptitude and a mass of other factors, not the least of these being the environment and management structures with in which they perform their role. Teachers must be seen as part of the solution, not part of the problem. Teaching involves a combination of roles as an individual and a team player, leading to professional development and potential efficiency respectively, choosing their own pedagogy ***(Clement and Vandenbergha, 2000).*** *There are number of factors that influence competency development that can be domestic (internal) and non-domestic (external) factors. Internal factors like lack of support from family, health issues etc. and external factors like lack of support from staff at all levels has an effect on teacher's performance.*

Competency at the individual level defined by ***Peter Drucker in 1985*** *is "the ability of an employee to offer superior performance in assigned tasks". According to* ***Zarifan, (1999)****, a competency is defined as "the practical intelligence about work situations that is supported by acquired knowledge that transforms an individual". Competency is "the set of social and communicational learning processes nurtured upstream by education and downstream by education system* ***(La Boterf, 1995).*** *The framework of teacher competency spanned field and research competencies, curriculum conceptualization, lifelong learning, emotional and environmental competencies that affect their values, behavior and communication besides their professional development and curricular studies* ***(Kiymet Salvi, 2000).*** *The readiness to learn, designing effective learning opportunities and providing appropriate support and challenge for teachers, were the insights sourced from Helmi's Model of racial identity* ***(Gretchen McAllister, Jacqueline Jordan Irvine, 2000).***

KEYWORDS: *Teachers, teaching attitudes, environmental competencies, Teaching Competency*

INTRODUCTION

Teacher effectiveness is influenced by not only the teaching strategies they adopt, but also the intellectual and social aspects associated with them. This is passed on to the academic achievement of the students that indicates the existence of a positive relationship between work orientation and competency of teachers **(Kammati Jayaramanna, 2001).** Collective work by teachers should be a concerted effort, as it helps to develop individual competence, but also leads to professional development. Family experiences and economic socialization play crucial roles in affecting the skills, knowledge and behavior of the teachers, rather than their financial literacy **(Braunstein and Welch, 2002).** Students tend to display lower levels of task behavior and performance, when teachers face social and economic challenges owing to paucity of resources **(Marzano, Marzano and Pickering, 2003).** It was found that psychological and institutional dimensions have a predominant impact on teaching competency, as compared to the personal and sociological dimensions (**George K.S., 2004).** Unfavorable work environment, excessive workload and lack of collaboration create exogenous pressure on teachers; while their individual personality and characteristics lead to exogenous pressure (**Antaniou et al., 2006).** Teaching efficiency among Shangai teachers is strengthened with a positive relationship with the students and parents, backed by good communicative skills **(Kazmi, 2008).** An empirical study on 506 pre and in-service teachers in an attempt to validate multi-dimensional multi-

cultural Teaching Competency Scale, revealed that racism awareness and multi-cultural teaching attitudes reflected internal consistency **(Lisa B.Spanierman, Euna Oh, P.Paul Heppner, 2010).**

The perceived problems of beginning teachers to study change in behaviours and attitude included classroom discipline, student motivation, assessment of student work, relationship with parents, teaching materials, person and situation specific differences **(Simon Veenman, 1984).** It was found by **J.Fredrick West and Glenna S.Cannon** in **1998** that both regular and special educators need to have skills in interactive communication, collaborative problem solving and personal characteristics to emerge competent, keeping in mind the need for developing collaborative consultation. A technology integrated training model was created by **A. Guzman and M.Nussbaum** in **September 2009**, based on the literature survey spanning curricular, methodological, evaluative, communicational, technological and personal/attitudinal domains. When the classroom environment deteriorates and is marked by student misbehavior and emotional exhaustion of the impact of social and emotional challenges, they are exposed to a "***burnout cascade***" **(Osher et al, 2007).** Teachers are exposed to high emotional stress as they are not encouraged to develop their ***"Social and Emotional Competence"*** (SEC) to handle students ably in a classroom situation **(Hargreaves, 1998).** Poor coping strategies by teachers inevitably result in burnouts or breakdowns with a three dimensional effect- namely emotional exhaustion; depersonalization and having a lack of personal accomplishment feel **(Maslach, Jackson and Leiter, 1997).** Palliative techniques to reduce stress involves constructive strategies like positive reappraisal or unconstructive strategies like avoidance or denial in terms of current health, personal life, demographics and support from colleagues. Regular contemplation practice facilitates ***"psychological presence"*** through enhanced emotional self-awareness.

Figure 1

Role of teaching faculty

(Source: Tripathi et al, (2010))

Supportive conditions of work enable faculty to make appropriate decisions and choices regarding their work profile, **(Deci, Eghrari, Patrick and Leone, 1994).** A dearth of job resources hampers faculty motivation and leads to their depersonalization and restricted personal achievements **(Bakker, Demerouti, Taris, Schaufelu and Schreurs, 2003).** When there is an autonomy supportive behavior at college, it is found that faculty tends to vest more trust in the management and experience greater satisfaction and lesser stress. This is the crux of the ***Self Determination Theory*** propounded by **Deci and Ryan, 1985,2000).** When there is direct/indirect self-improvement of teachers, their perceptions to Information Technology and interpersonal communication affect their competence in the field **(Hamonangan Tambunan, 2014).**

Mohammad Nadeem *et al.*, (2011)[197] in their article "Teacher's Competencies and Factors Affecting the Performance of Female Teachers in Bahawalpur" (Southern Punjab) Pakistan explored that poor salary, over workload, lack of library facilities, learning material, status of teacher, respect in society, mental health, teacher morale, responsibilities at home, lack of co-operation, working relation with staff and teacher are the factors which affect the female teachers' performance negatively.

SUMMATION OF REVIEWS

The above discussion has thrown light on the various perspectives of competency development of the teaching faculty, with an emphasis on the practical problems that hinder their professional growth and problems they face in their day to day life. All these remain in the landscape of the teacher competency, giving rise to the objectives of the study mentioned below.

OBJECTIVES OF THE STUDY

- To identify the problems affecting the competency development of the teaching faculty in Arts and Science Colleges.
- To suggest measures to help overcome the problems.

RESEARCH METHODOLOGY

Sampling Design

The researcher has used exploratory research for the purpose of the study. Primary data was collected using a structured questionnaire to analyse, interpret and infer the responses from the faculty respondents of various Arts and Science colleges in Chennai City. Secondary data was sourced from journals, magazines, books, besides surfing the net to gain access to information related to the study and enable meaningful inferences to be made and aid in the suggestion making stage. The questionnaire was divided into two sections – demographic profile of respondents made up of seven variables namely age, marital status, qualification, experience, income and designation of the respondents. The second section chosen for this study contained questions related to the18 problems affecting the competency development of the respondents, which were scaled using a 5 point Likert Scale, namely – work relation with superiors and HODs, work evaluation, research guidance, support from and attitude of family, lack of teaching materials and rapport with students to mention a few. The sample was chosen on a judgemental basis keeping the convenience of the researcher in mind. The details of the final sample of **540 respondents from 36 city Arts and Science colleges** are as follows:-

Details of the study sample

Total No. of Questionnaires	No. Circulated	No. Returned	No. Not Returned	No. Incomplete	Final Sample
	600	12	26	22	540

The researcher has analysed the data collected using Multi-Dimensional Scaling technique to draw meaningful interpretations and to make practical suggestions to overcome the problems that hinder the competency development of respondent teaching faculty.

LIMITATIONS OF THE STUDY

1) The study was exposed to a limited time frame that acted as a deterrent.
2) The responses have been subjected to the personal bias of the respondents that prevent data accuracy.
3) Lack of spontaneity from all respondents has forced the researcher to settle for a smaller sample size.

The researcher has applied Multi-Dimensional Scaling (MDS) on the data to draw apt and meaningful interpretations. The following is a brief insight into MDS as a potent tool in data analysis.

MULTI-DIMENSIONAL SCALING TECHNIQUE

MDS is "a map that conveys spatially, the relationship among items, wherein similar items are located proximal to one another, and dissimilar items are located proportionately further apart". It uses a geometric representation of the data, usually in a Euclidean space of fairly low dimensionality that is denoted **(Forrest W.Young, 1987).** MDS refers to a group of descriptive procedures that transform data into mapped elements in one or more spatial dimensions **(Kruskal and Wish, 1978).**

Theoretically, the configuration describes the underlying dimensions upon which judgements are based. MDS analysis depends on the similarity or dissimilarity of a set of objectives. MDS procedures help to measure self, person and product concepts and tests both validity and reliability of the data **(Naresh K. Malhotra, 1981).** It is normally used a data reduction technique and also applied to subjective ratings of dissimilarity between objects or concepts, by attempting to draw perceptions and preferences from the stimuli. MDS maps help to reduce complex data to the primary dimensions along which the items differ and permit visual comprehension of existing relationships. Data used in MDS are called by various names like similarities, dissimilarities, distances or proximities. The rating scales used in the study help draw the line of differentiation between them. Large numbers imply similarity between similar scales and vice versa. In a nutshell, MDS is an exploratory data analysis technique that reduces the data into an unpretentious spatial map that denote key relationships in a reasonable manner **(Mugavin, 2008).**

MDS calculations reveal ***Stress*** which is a lack-of-fit measure, wherein greater values indicate poorer fits; ***R Square*** is the squared correlation index that depicts the proportionate variance of the optimally scaled data applying MDS and is a goodness of fit measure; ***Spatial Map*** is the perceived relationship among the factors represented a s a geometric relationship among points in a MD space; ***Young's S Stress*** formula is a measure of statistical fit that ranges from 1 indicating the worst possible fit to 0 indicating an improvement in terms of reduction in Young's S Stress as the iterations progress; ***Stimulus Coordinates*** are the coordinates of each objective used to create the plots in the map. MDS assumes that the similarity between the two stimuli is some function of their partial similarities on each of the several perceptual dimensions.

RESULTS AND DISCUSSION

In MDS, the overall goal is to identify dimensions affecting competence. This provides the analyst with a global overview of the relationship between variables. Such insight is highly valuable in psychological research dealing with qualitative data derived from scaling, sorting or ranking task as well as from questionnaires **(Woosley et al, 2004)[40].**

The iterations in Young's Stress will continue until there is no improvement in S-Stress or the specified number of iterations is made. The default maximum number of iterations set by SPSS 30. A value of 0.10 or lesser is considered a good fit for two dimensions; while the same is around 0 .07 for a three dimensional solution.

Result -1

Stress values also indicate the quality of MDS solutions and measure the badness of fit or proportion of variance of optimally scaled data not accounted for. For Kruskal Stress formula 1, the recommendations for evaluating stress values are as follows:-

Table – 1
Table showing the thumb rule for Young Stress by Kruskal

Stress %	Goodness of Fit
20	Poor
10	Fair
5	Good
2.5	Excellent
0	Perfect

Table 2
Iteration history for the 2 dimensional solutions
(In squared distances)

Iteration	S- stress	Improvement
1	.14515	
2	.11437	.03078
3	.10908	.00529
4	.10790	.00118
5	.10757	.00033

(Source: Computed) Young's S-stress formula 1 is used. Iteration stopped because S-Stress improvement is less than .001000).

Discussion -1

Young's stress in this study turns out to be 0.10537, indicating that the stress value lies somewhere between "excellent" and "perfect fit" and hence acceptable, according to the Kruskal's rule of thumb **(Latinn et al, 2003).** When the stress values are observed, it is also seen that a relatively best improvement is achieved when moving from two dimensions, after which the improvement diminishes to an extent, and remains consistent as increased in the number of dimensions. There is a substantial improvement in fit with the addition of the second dimension. Further iterations have stopped at the fifth stage as the s stress improvement is less than 0.001.

Validation of the outcome

Stress value indicates badness of fit; Stress value obtained by **Malhothra and Dash,** in **2011,** is 0.105, while the Stress value needed for a fair fit is 0.10

RSQ values represent the proportion of variance or disparities of the scaled data in the row, matrix or entire data, substantiated by their corresponding distances. The index of fit or R square indicates how well the MDS model fits the input data. Though higher values of R square are desirable, value/s of or exceeding 0.60 are considered as acceptable. Table 3 shows the calculated values of Stress and R square form the input.

Table 3
Matrix Stress

Matrix Stress	RSQ
.10537	.94966

Discussion 2

Assessment of reliability and validity has been carried out by examining the R Square and stress values. The thumb rule for RSQ is "1" and any value closer to 1 represent the strength of the information. The squared correlation RSQ value for fitted data is 0.949, which is the proportion of variance of the scaled data (disparities) in the pattern (row, matrix or entire data) which is accounted for by their corresponding distances, implying a goodness of fit condition. It could also be interpreted as how well the MDS algorithm explains the variance in the data. Stress values are Kruskal's stress formula 1.From this, it is evident that nearly 94 percent of variance in the data has been accounted by the procedure. By using the Kruskal's Stress formula 1, Stress value are computed, which is 0.10537, which is a fair fit for the data (RSQ 8; Stress value 0.05), **(Malhotra 2010).** Both these values are within the acceptable range, and indicate that the study can be considered as reliable and valid. The spatial map has been interpreted by examining the coordinates and its relative positions regarding the problems.

Table 4
Configuration derived in 2 Dimensions
(Stimulus Coordinates)

Stimulus Number	Factors	Stimulus Name	1	2
1	Attitude of family members	Family	1.6846	-.5531
2	Responsibility of family members	Health	.2680	.3708
3	Health problem	Personal	.0991	-.2978
4	Distance of residing area	Relative	-1.8541	-.4947
5	Lack of cooperation	Education	.5425	-1.0497
6	Responsibility at home	Marriage	-.7217	-.5161
7	Frequent visits of relative	Visits	-2.1674	-.0709
8	Residential problem	Lack	-1.7225	-.6295
9	Salary Package	Financial	.4935	.3027
10	Library Facility	Facility	1.4471	.6929
11	Working relation with colleagues	Encourage	1.3477	.1450
12	Working relation with HOD	Superior	1.8233	-.4832
13	Work evaluation	Evaluation	1.2964	.2038
14	Research Guidance	Research	1.4828	.3532
15	Work Environment	Official	-.7067	.2437
16	Lack of teaching and learning materials	Colleagues	-.5757	.0718
17	Lack of rapport with students	Students	-1.2510	.5983
18	Professional attitude of teachers	Recognition	-1.4865	1.1128

(Source: Computed)

The above Table 5.106 gives us the coordinates of the eighteen variables on two dimensions (Table). We consider the placement of the variable and the corresponding co-ordinates to name the dimensions. On examination of the first dimension, it is found that work relationship with Superiors/ HOD (1.8233), attitude of family members (1.6846), research guidance (1.4828) and library facility (1.4471) are the major factors that help the teaching faculty to be competent. The second dimension has problems which are made up of non-recognition (1.112) and lack of rapport with students (0.583) that strongly affect the competency of the teaching faculty in colleges.

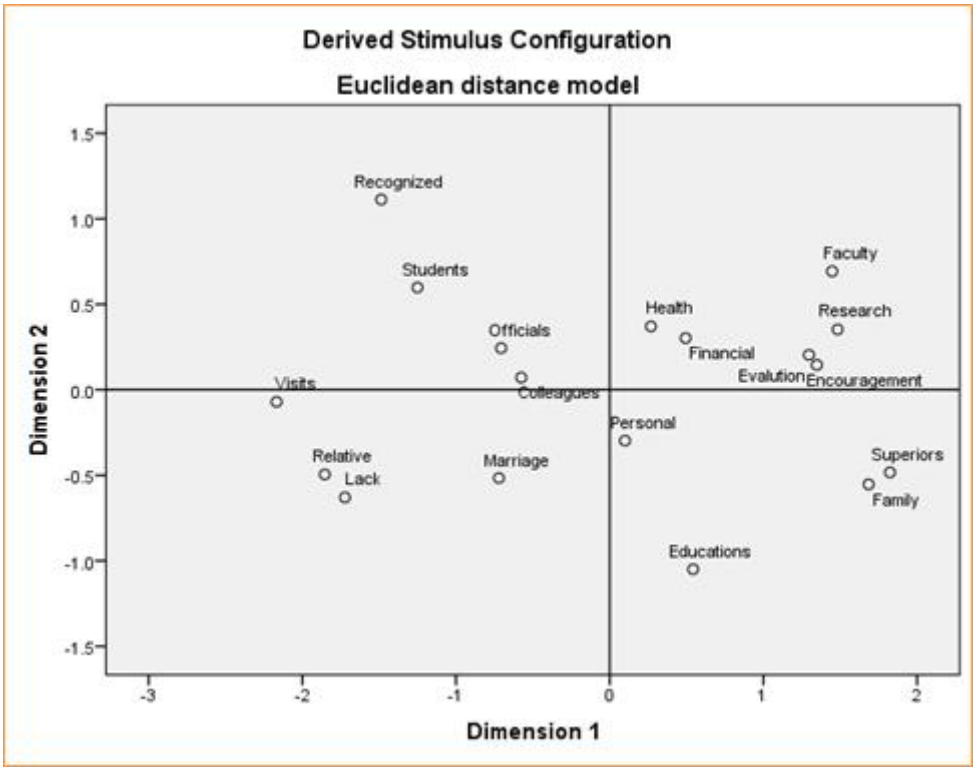
Interpretation

The above result implies that inter-personal relationship at both the official and personal level act as potent sources of competence development among faculty members. With the stringent UGC norms in vogue, insisting on a decent level of research interest, the onus lies on the guide to share his knowledge to bring out the innate skills of the faculty. This factor is dependent largely on the library facilities, which include having a wide array of books in terms of titles, subject coverage; subscription to leading peer reviewed journals, online journals and technology aided research methods. The enriched library facility not only supports the research intent of faculty, but also helps access to updated academic material leading to a mastery over their subjects. In the current scenario, non-financial initiatives topped by rewards and recognition by the management to high performing faculty act as promising methods of gently pushing them out of their comfort zone and improving themselves in terms of content and communication. The MDS technique attempts to find structure in data by rescaling a set of dissimilarities measurements into distance assigned to specific locations in a spatial configuration **(Giguere 2006[42]; Tsogo et al 2000[43])**. As such, points that are closer together on the spatial map represent similar objects while those that are further apart represent dissimilar ones. The underlying dimension extracted from the spatial configuration of the data is thought to reflect the hidden structures or important relationship, within it **(Ding 2006[44]; Young Hamer 1987[45]).** The Euclidean distance model presented in Table 5 reveals the various factors affecting the competencies teaching faculty of arts and science colleges. The spatial map developed subsequently helps to label the dimensions for interpretation by the researcher, based on the relative positions of the mapped factors. The gaps in the map indicate the potential opportunities to overcome the drawbacks/ factors preventing teacher competency among the 540 respondents.

Euclidean distance model is made of four quadrants of which two each relate to dimension I and II respectively. In each dimension, there are two quadrants relating the positive and negative values respectively. In each of the quadrants the highest and least values are considered, when the distance between two or more factors are **clumped** together and this cluster is given a name accordingly.

FIGURE 1

Euclidean distance model on factors affecting the competency development



On examination of positive side of Dimension I, it is noted that the attitude of family members and encouragement from superiors/HOD are perceived to be very similar as indicated by their closeness in the perceptual map and hence are referred as **"Attitude Stance".** However in the same we are able to see the personal health problem and education of dependents are distanced widely with outlier characteristics and hence cannot be clustered together. On the observation of the negative side of Dimension I, it is found that the distance between the two factors like visits of relative and residential problem are found lying next to each other and hence they are stamped together and referred as **"Domestic Perspective"**. However, in the same quadrant, marriage of dependent is an outlier and hence cannot be part of the cluster. Close similarity is also perceived between evaluation of work, work relation with colleagues, health problem of family members and lack of financial assistance lie close to each other. Thus, we can name this dimension as **"Performance standpoint".** The MDS map is useful in understanding the problems related to development of teacher competency.

As far as Dimension II is considered, the outlier factors are comprised of the atmosphere of faculty and research guidance cannot be grouped together owing to their far distancing. On examining the negative side of Dimension II, it is found that the distance between the two factors work environment and lack of learning and teaching material is closer to each other and hence they are grouped as **"Organizational Viewpoint".** The existence of a wide distance between the problem of not being recognized by the superiors and management coupled with poor student- faculty rapport are widely distanced are causative for them not being clustered together.

Inference

On observation of the two dimensional graph it could be inferred that the variables like education of dependents, attitude of family members, encouragement from superiors, visits of relatives and residential problem are the most affecting perceptual factors primarily determining the competence of the teaching faculty. The factors like, evaluation of work, work relation with colleagues, health problem of family members and lack of financial assistance, lack of learning and teaching material merely act as secondary determinants. Teaching involves a combination of roles as an individual and a team player, leading to professional development and potential respectively, by choosing their own teaching pedagogy **(Clement and Vandenberghe, 2000).** The factors other than the above determine the teaching competency of the sample respondents. Thus, the MDS analysis has enabled a better understanding of factors affecting the competencies in their performance and need to overcome by the above competencies to make their level of competence from high to very high. They are looking at competencies from two different perceptions which are clearly depicted in the Euclidean Distance Model. MDS is hence used in several psychological discussions owing to its ability to break the barriers created by strict theories, rendering it as a flexible analytical tool **(Dong, C.S, 2006).**

SUGGESTIONS

- ✓ The present day students have easy access to a volume of information, and it becomes imperative that the teacher be prepared with passion on all updated issues relating to classroom teaching. The teaching pedagogy of faculty to include case studies, brainstorming, practical exposure to theoretical concepts such that students are encouraged to

connect all the learning from various subjects in a holistic manner for better understanding and application at workplace.

- ✓ The library in the institution should not be the sole mode for knowledge sourcing. The teacher to take efforts to use novel methods like newspaper write-ups and published articles for remaining updated on information.
- ✓ The teacher to encourage students to use conceptual information gleaned from various subjects
- ✓ The teachers should be compassionate about their students and understand that the stress levels they are exposed to now is much more painful that the past. With scores of problems faced by new age students like hailing from broken homes, single parenting, extreme financial stringencies, sexual harassment at home and educational institutions, the teachers should work on bridging the gnawing gap with their students.
- ✓ Colleges to insist on teacher mentoring by dividing the students in a class among the faculty members in the department, and give them both academic and personal support to overcome the challenges that crop up their way.
- ✓ The management should also use psychometric testing during their recruitment process, to ensure that only those with a passion for teaching are roped in as faculty, and devise appropriate measures to practice gender equity at work.
- ✓ Family support plays a significant role in developing teaching competencies. Their understanding and encouragement will help faculty to excel in their performance.

CONCLUSION

The above study has practical application in the current day scenario when faculty do face several setbacks, especially from their home front. The women faculty are normally overburdened to perform well not only at college but also play their roles at the domestic front too. The positive support from their family members will surely help them to escalate not only their performance at work but also be change makers in the lives of their students. The onus of competency development among the faculty cannot be pinned on only them, but shared by the management, peers and family. Students also should be looked upon as allies in the progressive path and not as speed breakers. They may be used to try novel teaching techniques on a win-win basis. We may rightly conclude recalling the words of Peter Drucker "*Teaching is the only major occupation of man for which we have not yet developed tools that make an average person capable of competence and performance. In teaching, we rely on the naturals, the ones who somehow know how to teach".*

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