THE EFFECT OF TEACHER COMPETENCE, AUTONOMY SUPPORT AND RELATEDNESS ON GRADE EIGHT STUDENTS' INNATE NEEDS IN SCIENCE LEARNING

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Science strengthens basic scientific concepts that are applied across all spheres of life and industry globally. Thus, improving students' understanding in science is crucial for establishing a solid foundation across all areas of development. Moreover, teaching science should inspire children's curiosity by shifting the emphasis from merely memorizing facts to fostering creativity and innovation through practical applications. Self-Determination Theory assumes that students have an inherent tendency to be curious about their environment and are naturally motivated to learn and expand their knowledge. Evidence suggests that when teachers support of students' basic psychological needs such as autonomy, competence and relatedness, it enhances their self-regulation, academic performance, and well-being. According to Self-Determination Theory, fulfilling these needs is essential for the internalization of academic motivation. Hence, this study conducted to assess the effect of teacher competence, autonomy support and relatedness (CAR) on their Grade 8 students' competence, autonomy and relatedness in science. Quantitative approach was used in this study. Convenience sampling technique was used. Eighty science teachers and 2,475 Grade 8 students selected from schools in Sabaragamuwa and Western provinces in Sri Lanka were used in the study. Likert type multidimensional questionnaires were administrated teachers and students separately. Results reveal that there were very strong positive relationships between teacher competence, autonomy support and relatedness with their students' three innate needs autonomy, competence and relatedness [R^2 =.635 (2474), p=.000, R^2 =.764 (2474), p=.000, R^2 =.745 (2474), p=.000], respectively. Thus, teachers who demonstrate competence, provide autonomy support, and foster relatedness are effective in promoting these same qualities in students, thereby enriching meaningful learning in science to meet 21st century education goals.

Keywords: Autonomy support, Competence, Relatedness, Science, Self-Determination Theory

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INTRODUCTION

Self-Determination Theory assumes that inherent in human nature is the propensity to be curious about one's environment and interested in learning and developing one's knowledge. Evidence suggests that teachers' support of students' basic psychological needs for autonomy, competence and relatedness facilitate students' autonomous self-regulation for learning academic performance and well-being. Teachers can stimulate competence experiences when they focus on students' effort and rely on an individual's own abilities with past performance in evaluating students' work. Further, the concept of autonomy support (Deci and Ryan, 1985) means that an individual in a position of authority (teacher) takes the other's (students) perspectives acknowledging the others' feelings and providing the others with pertinent information and opportunities for choice, while minimizing the use of pressure and demands. Black and Deci (2000) showed that teachers' autonomy support was related to students' perceptions of competence, interest, enjoyment, and performance in science. In this way, students' needs satisfaction acts as a mediator between teachers' autonomy supportive style and students' motivation towards science. A teacher encourages students' relatedness mostly by making them feel connected to the environment and to follow students and teachers.

Therefore, there is an urgent requirement to uptake competence, autonomy support and relatedness to enhance science education in Sri Lanka. Thus, there is a need to identify basically to assess what extent teachers take responsibility for their students' competence, autonomy support and relatedness. However, there is a dearth of research investigation of these innate needs. Thus, this study was conducted to fill the gap of literature and to find some valuable investigations to enhance science education in Sri Lanka. Thus, the aim is to assess the impact of teacher competence, autonomy support and relatedness on their students' competence, autonomy support and relatedness in science to enhance meaningful learning.

Objectives

1. Assess teachers existing competence, autonomy support and relatedness in science;

2. Assess students existing competence, autonomy and relatedness in science; and

3. Compute the relationships of teacher competence, autonomy support and relatedness with students' competence, autonomy and relatedness in science.

Research Questions

1.1. What are the teachers' existing competence, autonomy support and relatedness in science?

2.1. What are the students' existing competence, autonomy and relatedness in science?

3.1. What are the relationships of teacher competence, autonomy support and relatedness with students' competence, autonomy and relatedness in science?

METHODOLOGY

Quantitative approach was used. The data were obtained from the two types of Likert type multidimensional questionnaires of teacher and students. Convenience sampling technique was used. Participants comprised 80 science teachers of selected schools in different educational zones in Kegalle, Rathnapura, Gampaha and Colombo districts in Sabaragamuwa and Western provinces in Sri Lanka. Furthermore, 2475 of Grade 8 students who learn science from those respective science teachers were included in the sample. Consent was obtained from the directors of zonal offices, selected principals, selected science teachers and Grade 8 students. The questionnaire was administrated and collected in the education zones. Quantitative analysis was conducted using SPSS 22.0 package. Additionally, teachers' competence, autonomy support and relatedness are the independent variables and students' competence, autonomy support and relatedness are the dependent variables. Treatment of missing data was conducted before starting the analysis. The data were screened for missing values to determine whether such values were missing at random or missing systematically. Tests of reliability was an important aspire in the data analysis process. Cronbach's alpha is the most frequently used measure of reliability.

RESULTS AND DISCUSSION

Table 1: *Reliability Estimates) for the Total Sample for the teacher and student multidimensional questionnaire of competence, autonomy support and relatedness*

Grouping	Competence	Autonomy support	Relatedness
Teacher	.925	.919	.915
Student	.870	.889	.802

The Cronbach's Alpha values were ranged between .915 and .925 in teacher Likert type multidimensional questionnaire. Moreover, Cronbach's Alpha values of student Likert type multidimensional questionnaire were ranged between .802 and .807. If this alpha coefficient value greater than 0.5, the items of the factors that were used in the questionnaire were standard. Therefore, these questionnaires were used as standard questionnaires in further studies.

The teachers' existing competence, autonomy support and relatedness in science

Table 2: *Descriptives of teachers' competence, autonomy support and relatedness*

Teacher Factor	Mean	Standard deviation	Skewness	Kurtosis
Competence	5.4254	.5499	-1.662	3.336
Autonomy support	5.3066	.5936	-1.134	2.219
Relatedness	5.3032	.5986	-1.247	1.823

Mean values of all three factors are near to the maximum value 6. Therefore, selected teachers have high competence, autonomy support and relatedness in science. The skewness is a measure of symmetry of data distribution. In this regard, data is negatively skewed. Thus, the distribution push to the left side. Kurtosis is a measure of the tailedness of a distribution. Acceptable values of Skewness fall between -3 and +3 and Kurtosis is appropriate from a range of -10 and +10. Thus, the Skewness values and Kurtosis Values are in the acceptable level. Thus, the values in competence, autonomy support and relatedness are high and they indicate strong teachers' competence, autonomy support and relatedness.

The students' existing competence, autonomy support and relatedness in science

Table 3: *Descriptives of students' competence, autonomy support and relatedness*

Student Factor	Mean	Standard deviation	Skewness	Kurtosis
Competence	5.4986	.5704	-1.668	3.627
Autonomy support	5.2755	.6504	-1.111	1.314
Relatedness	5.2813	.6662	-1.101	.944

The mean values of all three psychological factors were close to maximum value 6. Therefore, the students have high competence, autonomy support and relatedness in science. The skewness values and kurtosis values are also in acceptable levels. Thus,

the values in these are high and they indicate strong students' competence, autonomy support and relatedness.

The relationships of teacher competence, autonomy support and relatedness with students' innate needs in science

Table 4: L*inear regression to assess the relationships of teacher competence, autonomy support and relatedness with students' innate needs*

Factor		R^2 Value	p value
Teacher	Student		
Competence	Competence	.635	.000
Autonomy support	Autonomy support	.764	.000
Relatedness	Relatedness	.745	.000

According to the above table, there are positive strong relationships of teacher competence, autonomy support and relatedness with student competence, autonomy support and relatedness. Further, teacher autonomy support and student autonomy support have very strong positive relationship. Being in an autonomy supportive environment is associated with psychological well-being, learning achievement and positive development (Reeve, 2009). Further, the need for relatedness for students is fundamental to optimal development of student given that interpersonal relationships can buffer against stress and are instigators of positive motivational states of students learning (Ryan and Deci, 2002). Furthermore, the need for competence is satisfied when one experiences their behaviour as effectively enacted of students in their learning science (Niemiec and Ryan, 2009). Therefore, these three innate needs are essential for students' learning in science.

CONCLUSION

The teacher psychological factors such as competence, autonomy support and relatedness are strongly affect their students' competence, autonomy support and relatedness. Thus, teachers contribute enormously to enhance students' above innate needs on intrinsic motivation in science.

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