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Differential Effect of Socio-demographic Factors on Academic Interest in Biology of Higher Secondary School Students

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Abstract: This descriptive study aimed to study the differential effect of gender, residential locale and socio-economic status of the family on higher secondary school students' interest in biology. Data were collected from a simple random sample of 162 higher secondary school students from Kozhikode district of Kerala. Apart from a personal data sheet, the Interest Inventory in Biology (IIB) (Muraleedharan & Raveendranathan, 2018) and the Brief Socio-Economic Status Scale developed by Arjunan (2014) were administered to collect the data needed for the study. Independent sample t-test, one-way ANOVA and three-way between-subjects ANOVA were performed to test four null hypotheses formulated for the study. Analysis exposed the presence of a significant gender difference in higher secondary school students' interest in biology, favouring the boys. Residential locale was found to be a significant factor that discriminate higher secondary school students on the basis of their interest in biology. Students from rural area excelled their urban counterparts in their interest in biology. Socio-economic status of the family was also found to be decisive in developing learners' interest in biology. The selected socio-demographic factors was found to have significant main effect on higher secondary school students' interest in biology, but the interactive effect of these factors are not significant.

Key words: Interest in biology, Socio-demographic factors, Higher secondary school students.

Introduction

Biology is, perhaps, the most important school subject which is related to the existence and survival of human being as a species and has direct connection with learners' health and welbeing. The objectives of teaching biology in secondary schools are diverse and cumulative. With the gradual shift of emphasis in education from the mastery of subject matter as an end in itself to the careful reconsideration of the needs and interests of learners, a vital problem in education becomes that of determining these needs and interests. If the teachers do not have clear understanding of these needs and interests, their teaching will be ineffective. Biology teachers are saddled with the responsibility of enabling the learners to accomplish a series of instructional objectives at different domains of behaviour. Cultivating interest in learners is an important learning outcome as it is related to a wide range of learning indicators (Pintrich & Schunk, 2002). Fostering learners' interest in biology has long been considered as an important step to enhance school outcome and nurturing creativity in science (Knekta, Rowland, Corwin & Eddy, 2020). When allowed to pursue their own interests, students participate more, stay involved for longer periods, and exhibitt creative practices in doing science (Festus & Ekpete, 2012; Seiler, 2006). Interest in academic subjects has also been found to motivate learners (Renninger & Hidi, 2015; Ryan & Deci, 2000) influence future educational training (Krapp, 2000) and career choices (Baram-Tsabari, Sethi, Bry & Yarden, 2010).

Accomplishment of instructional objectives in any school subject is a function of instructional strategies and various factors associated with the teacher and the learner. Apart from the psychological makeup of the learner, socio-demographic factors are also found to be decisive in achieveing many of the instructional objectives in biology (Joxy, 2015). Socio-demographic factors affecting learning are difficult to control as they are less susceptible to manipulation of any kind. A knowledge of the differentential effect of such factors on interest in biology of secondary school students will be helpful for teachers to regulate the influence of such factors to optimise accomplishment of this vital objective teaching biology.

Objectives of the Study

This study has the following specific objectives in view:

1. To find out the differential effect of gender, residential locale and socio-economic status on interest in biology of higher secondary school students of Kerala.

2. To find out the main effect and interaction effect of socio-demographic factors on interest in biology of higher secondary school students of Kerala.

Hypotheses of the Study

The following null hypotheses were tested for the study:

1. There is no significant difference between boys and girls in the higher secondary schools with respect to their interest in biology.
2. There is no significant difference between rural and urban students in the higher secondary schools with respect to their interest in biology.
3. There is no significant difference among higher secondary school students from high, average and low socio-economic status with respect to their interest in biology.
4. Socio-demographic factors of have no significant main effect and interaction effect on higher secondary school students' interest in biology.

Methodology

This descriptive study employed normative survey method. Adolescents studying in plus one and plus two classes of higher secondary schools affiliated to Board of Higher Secondary Education (Govt. of Kerala, India) constitute the population of the study. A simple random sample of 162 higher secondary school students (boys = 77; girls = 85) were selected from different higher secondary schools of Kozhikode revenue district. The data for the study were collected by administrating the Interest Inventory in Biology (IIB) (Muraleedharan & Raveendranathan, 2018). The IIB is a standardized instrument having a concurrent validity of 0.68 and test-retest reliability (4 weeks interval) of 0.84. The socio-economic status of the participants was assessed by employing the Brief Socio-Economic Status Scale developed by Arjunan (2014). The tools were administered under standardised conditions in group situations and the data thus collected were analysed using appropriate statistical techniques with the help of SPSS (Windows 16.0).

Analysis and Interpretation

In order to find out the differential effect of gender on interest in biology of higher secondary school students, independent sample t-test was performed. The data and result of the analysis is presented in Table 1.

Table 1: Comparison of boys and girls regarding interest in biology

Samples	N	M	SD	SE_M	t-value	Sig.
Boys	77	12.95	1.806	.206	4.025	.001
Girls	85	11.73	2.026	.220		

The t-value obtained on comparing the gender based sub-samples of higher secondary school students with respect to their interest in biology is significant ($t = 4.025$; $p<.001$). It shows that there is true difference between boys and girls regarding their interest in biology. A closer observation of the mean estimates reveals that boys excel girls in their interest in biology.

The differential effect of residential locale on interest in biology of higher secondary school students was explored by comparing the IIB scores of rural and urban students. The data and result of the independent sample t-test performed in this context is given in Table 2.

Table 2: Comparison of rural and urban students regarding interest in biology

Samples	N	M	SD	SE_M	t-value	Sig.
Rural	93	12.86	1.839	.191	4.258	.001
Urban	69	11.57	2.011	.242		

Comparison of rural and urban students with respect to the IIB scores produced a t-value which is large enough to be significant at 99.9% confidence interval ($t = 4.258$; $p<.001$). Inspection of the mean scores exposes that students from rural areas surpasses their urban counterparts in their interest in biology.

In order to find out the differential effect of Socio-Economic Status (SES) of the family on interest in biology of higher secondary school students, the sample was separated into High-, Average-, and Low SES groups based on the arithmetic mean (M) and standard deviation (σ) of the SES scores by employing the $M \pm \sigma$ principle. The groups are further compared by employing one-way ANOVA to find out whether there is any significant difference in their interest in biology. The summary of the one-way ANOVA performed in this context is given in Table 3.

Table 3: One-way ANOVA: Socio-economic status and interest in biology

Interest In Biology	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	66.857	2	33.428		
Within Groups	585.711	159	3.684	9.075	.001
Total	652.568	161			

Th F-ratio estimated on comparing students from high, average and low socio-economic status with respect to their interest in biology is significant (F = 9.075; p<.001). It exposes the presence of a true difference among students from different SES regarding their interest in biology. Scheffe's post hoc test of multiple comparison was further performed so as to find out the group-pairs which differ significantly. The data and result of the post-hoc test is given in Table 5.

Table 4: Post hoc test for the comparisons of interest in biology of students from different SES.

(I) SES	(J) SES	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
LOW	Average	1.181*	.392	.012	.21	2.15
	High	2.150*	.510	.000	.89	3.41
AVERAGE	Low	-1.181*	.392	.012	-2.15	-.21
	High	.969	.420	.073	-.07	2.01
HIGH	Low	-2.150*	.510	.000	-3.41	-.89
	Average	-.969	.420	.073	-2.01	.07

*. The mean difference is significant at the 0.05 level.

The result of the Scheffe's post-hoc test given in Table 4 shows that higher secondary school students from Low SES differ significantly from their fellow students from Average SES (mean difference = 1.181; p<.01) and High SES (mean difference = 2.150; p<.001) in their interest in biology. No true difference, however, was noticed between students from Average SES and High SES (mean difference = 0.969; p>.05). A closer observation of the data shows that students from Low SES excel students from Average SES and High SES in their interest in biology.

In order to find out the main effect and interaction effect of gender (GE), residential locale (RL) and socio-economic status (SES) on the Interest in Biology (IB) of higher secondary school students, three-way between-subjects ANOVA was performed. The data and result of three-way analysis of variance is given in Table 5.

Table 5: Summary of 2X2X3 factorial design ANOVA for interest in biology

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	201.315[a]	11	18.301	6.084	.000
Intercept	14780.925	1	14780.925	4.913E3	.000
GE	27.742	1	27.742	9.222	.003
RL	43.904	1	43.904	14.594	.000
SES	32.268	2	16.134	5.363	.006
GE * RL	.931	1	.931	.309	.579
GE * SES	14.736	2	7.368	2.449	.090
RL * SES	3.257	2	1.628	.541	.583
GE* RL * SES	8.623	2	4.311	1.433	.242
Error	451.253	150	3.008		
Total	25196.000	162			
Corrected Total	652.568	161			

[a]. R Squared = .308 (Adjusted R Squared = .258)

The result of the three-way ANOVA carried out to find out the main effect and interaction effect of selected socio-demographic factors on interest in biology (IB) of higher secondary school students shows that the three independent variables, viz., gender (F = 9.222; p<.01), residential locale (F = 14.594; p<.001) and socio-economic status (F = 5.363; p<.01) have significant main effect on interest in biology. None of the factors, however, has significant interaction effect on higher secondary school students' interest in biology.

Conclusions

1. Gender is a significant factor that discriminate higher secondary school students on the basis of their interest in biology. The Hypothesis-1 (there is no significant difference between boys and girls in the higher secondary schools with respect to their interest in biology), is therefore, rejected.
2. Residential locales exert a significant differential effect on higher secondary school students' interest in biology. The Hypothesis-2 (there is no significant difference between rural and urban students in the higher secondary schools with respect to their interest in biology) is, consequently, rejected.
3. Higher secondary school students' interest in biology is significantly influenced by the socio-economic status of their family The Hypothesis-3 (there is no significant difference among higher secondary school students from high, average and low socio-economic status with respect to their interest in biology) is, hence, rejected.
4. Socio-demographic factors like gender, residential locale and socio-economic status have significant main effect on higher secondary school students' interest in biology. These factors, however, do not have any significant interaction effect on interest in biology of the learners. The Hypothesis-5 (socio-demographic factors of have no significant main effect and interaction effect on higher secondary school students' interest in biology) is, therefore, partially accepted.

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