CHAPTER 4
RESULTS AND FINDINGS

The current chapter presents a detailed enumeration of all the results, objective by objective and every block of results is followed by corresponding findings. This chapter is divided into five major sections, related to the following:

1. Identification of active and passive forms of social learning affecting ESCB.
2. Determining the influence of cognitive and external variables on ESCB.
3. Identifying the impact of active and passive forms of social learning on ESCB.
4. Determining the impact of active and passive forms of social learning on attitude towards ESCB.
5. Identifying the relationship between attitude towards ESCB and ESCB among children.

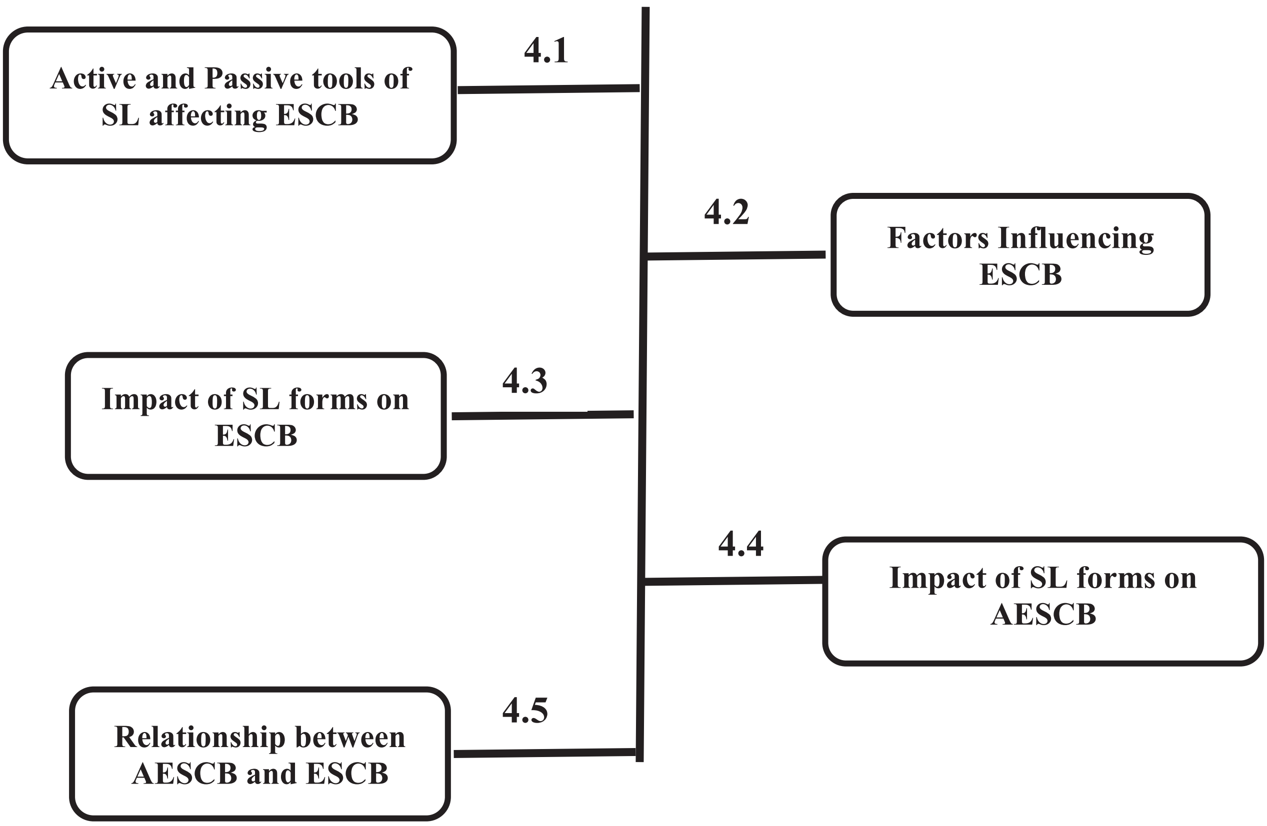


Figure 12: A schematic representation of chapter 4

4.1. Identification of active and passive tools of SL affecting ESCB

As mentioned in the chapter on research method, a thorough investigation of three sources was conducted, namely, textbooks, research literature and teachers of primary school classes. Results for each of the three investigations are reported here with similar findings.

4.1.1 Results for AL & PL tools from textbooks

Initial search to gather environmental studies textbooks from government and private schools revealed 2 facts: one, there were no textbooks for class I and II for government schools and for class I & II in private schools; two, teachers referred to a pre-decided and given framework in place of textbooks. A thorough scanning of all other textbooks (for classes III, IV and V for Government schools and classes II to V for private schools) was undertaken to identify AL and PL tools. Results showed that both types of tools had been suggested for use (chapter end exercises and within chapter activities).

Results summarizing all the tools have been provided in Tables 26a and 26b. The schema for summarizing active tools was taken from Bonwell & Eison (1991) as rationalized in "Method" chapter which organized active tools into 11 categories. For passive tools, 6 distinct passive tools were identified (namely, lecture, visual media {examples: films, videotapes, TV}, classroom presentation for students, computerized learning assignments, guest speaker, reading textbooks) & were used as categories – they were distinct from one another and had in some cases few sub tools under a particular category. While table 26a and 26b indicate if a particular type of tool was found at attest one of the places in referred text book,

Table 26a: Active tools found in private and government school textbooks

	School type					
Active tools	**Private**			**Government**		
Class -→	3	4	5	3	4	5
1. Projects	Yes	Yes	Yes	Yes	Yes	Yes
2. Demonstration	Yes	Yes	Yes	Yes	Yes	Yes
3. Writing	Yes	Yes	Yes	Yes	Yes	-
4. Problem Solving	Yes	Yes	Yes	Yes	Yes	Yes
5. Discussion	Yes	Yes	Yes	Yes	Yes	Yes
6. Visual Based Instruction	Yes	Yes	Yes	-	-	-
7. Field Work	-	Yes	-	-	-	-
8. Cooperative learning	-	Yes	-	-	-	Yes
"Yes" means specific tool category was found						

Table 26b: Passive tools found in private and government school textbooks

	School type					
Passive tools	**Private**			**Government**		
Class -→	3	4	5	3	4	5
1. Narrate/Tell Stories	Yes	Yes	Yes	-	-	-
2. Observation	Yes	Yes	Yes	Yes	Yes	Yes
3. Visual based	-	-	-	Yes	Yes	Yes
"Yes" means specific tool category was found						

4.1.1.1. Findings for AL & PL tools from textbooks

Following aspects and findings were generated after a thorough look at the tables summarized above:

1) AL tools are more frequently found than PL tools in both textbooks.
2) In terms of scope of coverage, 8 out of 11 active tool categories (approx. 72%) were found in government and private school textbooks, while only 3 out of 7 types (42%) of passive tools were covered in the textbooks. Thus, it can be broadly said that based on frequency and coverage, active tools seem to be favored more by school boards which decide the overall content and type of coverage.
3) Another finding revealed that same AL or PL tools were not prescribed in textbooks across classes even in the same type of school. This could have been intentionally designed for good, for example, to suit the age of the kids (for example, "projects" has been given for III and above classes in private schools but not in class II). However, many other instances do not seem to be logical (for example, an activity like "writing" is deemed appropriate for classes III and IV but not for class V in private schools. Similarly, "field trip" is found suitable for class IV only for private schools. Similarly, government school's textbooks prescribe "writing' for class III and IV but not for class V. Current study did not look into the reasons for such observations; it can be taken in later studies.
4) Yet another interesting finding was that among active tools, 2 tools, namely, visual based instruction and field work were completely absent from government school textbooks while cooperative learning was only provided for class V. Similarly, fieldwork and cooperative learning was present only for class III in private school.
5) Similarly, while storytelling/ narration was totally missing from government school textbooks; visual aids (like posters and charts) was missing from private school instruction material.

6) Quite a few active tools such as role plays, practical simulation, computer-based activities, peer teaching, online discussion, lab experiments, games, concept map, and creating multimedia presentations have not figured anywhere in textbooks but have been the subject of research investigations.,

4.1.2. Results for AL & PL tools from research literature

An in-depth literature review of 20 research studies consisting of research papers and articles revealed a list of AL and Pl tools. A summary of the type of tools considered by studies has been provided in Table 27. The selection of studies here was not restricted to those considering ESCB or related variables only. Thus, studies' population ranged from primary school to college/higher education.

Table 27: Overview of studies on active and passive learning forms

Author name	Year	Level of students	AL tools	PL tools
Kitzerow.	1990	Upper middle school	Yes	-
Bonwell & Eison.	1991	Higher education	Yes	-
Kyriacou.	1992	Secondary school	Yes	-
Glasgow & Bush	1995	11th-grade students	Yes	-
Ebert, Brewer & Allred	1997	High school	Yes	Yes
Faust & Paulson	1998	College students	Yes	Yes
Bonwell	1999	Higher education	Yes	Yes
McCarthy & Anderson	2000	High school	Yes	Yes
Niemi.	2002	Primary and secondary	Yes	-
Rodrigues	2004	Higher education	Yes	Yes
Prince.	2004	Higher education	Yes	Yes
Wingfield & Black	2005	Higher education	Yes	Yes
Carpenter	2006	Higher education	Yes	Yes
Michel	2006	Higher education	Yes	Yes
Kuster & Vila	2006	Higher education	Yes	-
Dengler	2008	Middle school	Yes	-
Omelicheva & Avdeyeva	2008	Higher Education	Yes	Yes
MacVaugh & Norton.	2012	Higher education	Yes	-
Edward	2015	Middle school	Yes	-
"Yes" means specific tool category was found				

In the next step, only those studies were explored in-depth for the actual tools which were conducted at the school level to get closer to the context of this work. Actual tools found are reported in table 28. A total of seven such studies is given in table 28.

Table 28 : List of AL and PL tools from school level studies

Author name	Year	Students studied	AL tools	PL tools
1. Kitzerow.	1990	Upper middle school	Group role plays	-
2. Kyriacou.	1992	Secondary school	Demonstration, problem-solving, group discussion, practical simulation, computer-based activities, project	-
3. Glasgow & Bush	1995	11^{th}-grade student	Collaborative project, team problem-solving, decision-making, role playing	-
4. Ebert, Brewer & Allred	1997	High school	Concept map, daily quizzes, peer teaching, writing activities	Lecture
5. Niemi.	2002	Primary and secondary	Cooperative learning	-
6. Dengler.	2008	Middle school	Online discussion	-
7. Edward S.	2015	Middle School	Concept maps, problem-solving activities, creating multimedia presentations, group discussion, lab experiments , hands-on projects, games, building models	-

101 active tools and six passive tools were identified in all. The list of 101 active tools was obtained after refining the longer list from literature and were classified on Bonwell's scheme (1991) as discussed in methodology chapter and is presented in Table 29.

Following are six passive learning tools: lecture (Rodrigues, 2004; Wingfield, 2005; Carpenter, 2006; Smith & Smith, 2014) visual media (Rodrigues, 2004), classroom presentation for students (Rodrigues, 2004), computerized learning assignments (Rodrigues, 2004), guest speaker (Rodrigues, 2004), reading textbooks (Rodrigues, 2004). Examples are given in table 30

Table 29: Tools classified on Bonwell's Classification

S.No	Active tool classification	Examples
1	Pausing Lecture	Clarification Pauses, Muddiest (or clearest) Point, Note comparison/sharing, Worksheets
2	Test & Quizzes	Readiness Assessment Test, Puzzles/paradoxes, Immediate feedback, Assessment technique, Article reading quiz, Waiting time, Finger Signals, Pre-theoretic intuitions quiz
3	Demonstration	Interactive demonstration, Lab-work, Simulation, Internships
4	Feedback Lecture	Fact or Opinion, Fist-to-five, Active- Review Sessions, Student Summary of another student's answer
5	Responsive Lecture	Submitting question, One-minute papers, Preparing quiz/test question, The fish bowl, Speakers
6	Question and Discussion	Fishbone Strategy, Five questions, Giant steps, Jeopardy, Mind Movies, Opinion finders, People bingo, Revolving circle, Memory game, Traffic Lights, Odd one out, Brainstorming, Drama, Debates, Panel discussion, Class discussion, Online discussion forum, Card ranking, Dot voting
7	Visual Based Instruction	Concept map, Presentations, Visual-based instruction, Collage, Consequence wheel, Mind maps, Questions followed by visual media (films, videotapes, TV)
8	Writing in class	Daily(or weekly), journal assignment, Writing and speaking tasks, Assignment Diaries, Reports, Art spiral, Research Summary or Abstracts
9	Problem Solving	Case studies, Dartboard evaluation, Graffiti board, Hot air balloon, PMI (plus – minus – interesting), SWOT (strengths, weaknesses, opportunities, threats)
10	Computer-Based Learning	Computer-aided instruction
11	Cooperative Learning	Think-pair-share, Role-playing, Diamond Ranking, Each One Teach One, Jigsaw, Icebreakers and Openers, Carousel, Conscience alley, Constructing Walls, Creative Matrix, Hassle lines, Hot seating, KWL (know – want to know – learned), Post-it collection, Snowballing, Taboo, Two Stars and A Wish, Peer Teaching, Games, Group/Individual projects, Field Work, Mock negotiation

Table 30: Examples of Passive tools

S.No	Passive Tools	Examples
1	Lecture	Delivering content orally
2	Visual media	Posters, films, videotapes, TV, charts, diagrams, maps
3	Presentation	Presentation for students on the blackboard, LCD, projector, etc.
4	Computerized learning assignments	Home assignment on computer, Online projects,
5	Guest speaker	
6	Textbooks	Reading

4.1.2.1. Findings for AL & PL tools from research literature

A thorough look at the results in Tables 27, 28, 29 and 30 lead to following observations:

1) AL tools are more frequently found than PL tools in research papers.
2) Most of the studies focused mostly higher school students. Very few studies focus primary school children.
3) There are various examples of active learning tools (within categories) that are identified in the literature. Whereas a number of passive learning tools (within categories) is few.
4) Very few papers have studied the effectiveness of AL and PL tools together. Most of the papers have focused AL tools only.

4.1.3. Results and Findings for AL & PL tools from teachers' perceptions

The third source for collecting information regarding AL and PL tools was drawn from an actual setting where primary school teachers who were using such tools for education on a frequent basis were interviewed. It was attempted to throw more light by:

(i) Accessing teachers' perceptions regarding AL and PL tools, specifically, it looked into what was teachers' perception about the appropriateness of using a certain tool to teach ESC behaviors

(ii) Exploring teachers' ideas/ opinions about opportunities and constraints faced in tool implementation.

4.1.3.1. Results for AL tools

The questionnaire (Annexure 2) had three sections: First section collected information about following demographic variables: school name, classes taught, subject taught, events; Second section recorded teacher's perceptions as mentioned above with respect to 11 AL tool categories and the third section recorded perceptions with respect to 6 PL tools. 16 ESCB instances were used across 3 stages of sustainable consumption behavior (purchase, use, and dispose-off) for each of second and third sections; an example of ESCB instances are given below:

I) Purchase:

1) Buy writing paper and notebooks made from recycled paper

2) Buy reusable bottles and lunch box

II) Use:

1) Borrow or hire stationery items that you only need occasionally

2) Repair bags and shoes on time so that they last longer

III) Dispose off:

1) Pass on old textbooks and storybooks to others

2) Give newspaper for making notebooks and writing papers to *kabadiwala*[18]

A total of 50 teachers from class I to V (included 40 private and 10 government teachers) from government and private schools were interviewed. Any teacher could identify as appropriate more than one AL or PL category as appropriate to teach any particular ESCB; the maximum recordable frequency was:

- For each AL tool category: Tool wise maximum frequency was 550: Calculation justification: [50 participants * 11 AL tool categories] and behavior wise maximum frequency was 800: Calculation justification: [50 participants * 16 ESCB]
- For each PL tool category: Tool wise maximum frequency was 300: Calculation justification: [50 participants * 6 PL tools] and behavior wise maximum frequency was 800: Calculation justification: [50 participants * 16 ESCB]

Recorded frequencies are shown in Table 31 (AL tools for private schools), table 32 (AL tools for government schools), table 33 (PL tools for private schools) and table 34 (PL tools for government schools). The results in each of the four tables have been arranged in descending order with respect to the last column that shows total frequencies for each tool showing the most preferred tool in the top row.

Table 31: Selection frequency for AL tools in private schools

	Classes					
AL tools	**I**	**II**	**III**	**IV**	**V**	**Total**
Pausing Lecture	82	92	70	92	95	431
Visual based instruction	65	67	73	104	98	407
Demonstration	58	71	66	76	43	314
Question and Discussion	15	28	11	24	29	107
Cooperative learning	10	17	11	20	17	75
Writing in class	5	25	3	12	10	55
Responsive Lecture	3	17	6	6	20	52
Feedback lecture	5	17	6	13	4	45
Test and Quizzes	4	17	4	8	6	39
Computer based learning	2	1	10	5	14	32
Problem solving	0	0	1	1	0	2
Total responses	249	352	261	361	336	1559

[18] A person who buys and sells discarded or second-hand objects

Table 32: Selection frequency for AL tools in government schools

	Classes					
AL tools	**I**	**II**	**III**	**IV**	**V**	**Total**
Pausing Lecture	20	18	17	29	25	109
Visual based instruction	17	12	17	23	24	93
Demonstration	11	5	9	11	12	48
Cooperative learning	4	7	1	12	5	29
Question and Discussion	10	0	0	3	0	13
Writing in class	3	0	7	0	0	10
Test and Quizzes	2	0	0	0	1	3
Feedback lecture	0	0	0	0	2	2
Computer based leaning	2	0	0	0	0	2
Responsive Lecture	0	0	0	1	0	1
Problem solving	0	0	0	0	0	0
Total	69	42	51	79	69	310

4.1.3.1.1. Findings for AL tools

Insights related to AL tools were structured around the interpretation of frequency summaries (tables 31, 32) to identify patterns and consistencies in choice of tools if any,
The findings have been given below:

1) The choice, as well as relative positions as seen from the last column of Tables 31 and 32, showed that the top three choices, namely, pausing lecture, visual based instruction and demonstration {in the same order} - of teachers from both schools matched exactly, showing in turn the consistent and high preference for using them to teach sustainable consumption behavior.
2) Results reveal that in both types of schools, problem-solving is the lowest choice and that too for all classes except III and IV for a private school where they have received really low frequencies, which can be easily considered negligible.
3) Computer-based learning, test& quizzes, responsive lecture and feedback lecture got the least support in both school types. Thus, the pattern of top three choices and worst five choices from private schools was almost replicated by government school responses with relative positions changing only for three tools in bottom five rows.

Following schema shows the contrasting of lowest five tools' pattern across government and private schools.

Private School		Government School
Responsive Lecture		Test and Quizzes
Feedback lecture		Feedback lecture
Test and Quizzes		Computer-based learning
Computer-based learning		Responsive Lecture
Problem solving		Problem solving

4.1.3.2. Results for PL tools

As 50 teachers (40 private and 10 government) were interviewed from primary schools, therefore maximum frequency in each cell would be 300 (50 teachers * 6 PL) whereas 800 (16 ESCB * 50 teachers) when considering 16 ESCB behaviors for which they were asked to map PL tool categories. Tables 33 and 34 give recorded frequencies for PL tools.

Table 33: Selection frequency for PL tools in private schools

	Classes					
PL tools	**I**	**II**	**III**	**IV**	**V**	**Total**
Listening to lecture	80	97	84	114	93	468
Visual media	73	67	68	90	52	350
Classroom presentation	27	33	28	33	27	148
Reading text books	19	26	41	29	28	143
Computerized learning assignments	11	20	19	26	41	117
Guest speakers	0	0	0	0	0	0
Total	210	243	240	292	241	1226

Table 34: Selection frequency for PL tools in government schools

	Classes					
PL tools	**I**	**II**	**III**	**IV**	**V**	**Total**
Listening to lecture	19	16	19	24	20	98
Visual media	18	15	15	11	23	82
Classroom presentation	4	8	4	11	10	37
Reading text books	11	1	8	3	1	24
Computerized learning assignments	8	3	0	10	3	24
Guest speakers	0	0	0	0	0	0
Total	60	43	46	59	57	265

4.1.3.2.1. Findings for PL tools

Insights related to PL tools were structured around the interpretation of frequency summaries (tables 33, 34) to identify patterns and consistencies in choice of tools if any,
The findings have been given below:

1) The choice, as well as relative positions as seen from the last column of table 33, 34 of the top three choices (namely lecture, visual media and classroom presentation) of teachers from both schools, matched exactly, showing, in turn, the consistent and high preference for using them to teach sustainable consumption behavior.
2) Similarly, lowest two tools' pattern across government and private school was exactly replicated making reading textbooks the second-last choice and computerized learning assignments the last choice to have non-zero frequencies.
3) Lastly, guest lectures were found to get absolutely no votes – teachers stating its infeasibility. It was thus decided to remove this tool from later investigations.

4.2. Identifying cognitive and external factors from SCT influencing ESCB

This section covers the description of results and findings related to objective two, which was to investigate the influence of cognitive and external factors (independent variables or IV) from SCT framework on ESCB (dependent variable or DV). 12 Independent Variables were identified from extensive literature review and measures for all of them and ESCB were extracted from extant literature (details in the chapter on Method). The main study adopted a primary data collection approach using a structured questionnaire was used, and data were collected from 649 children from private and government schools. While the chief statistical tool that was used to assess the influence was multiple regression, other tests were also conducted, namely, principal component analysis, Bartlett's test of sphericity, Kaiser-Meyer-Olkin (KMO) test for sampling adequacy. For conducting PCA and related tests, a pilot data collection was conducted with 400 primary school students (250 from private schools & 150 from government schools belonging to classes 3rd, 4th, and 5th) on 12 IVs and 1 DV. All multiple regression assumptions were also tested for data from 649 children in the main study. A sequential description is given in two sub-sections passages that follow:

1) Results & findings for identifying factors influencing ESCB in primary school children

2) Results & findings for identifying factors influencing ESCB in private and government primary school children (as an extension of objective 2).

4.2.1. Principal Component Analysis

The determination of the number of factors to extract should be guided by theory, and it was in this case; at the same time, it needs to be informed by running the analysis extracting possible factors to check if factors really emerge to finally make way for the most interpretable results. On this basis, it was decided to run Principal Component Analysis (PCA) using SPSS (version 16). The requirement that all variable inputs into PCA must be ratio or interval was met as all variables (12 independent variables and 1 dependent variable, namely, ESCB) were measured on a Likert scale. These 13 variables were measured on a total of 82 items (summary given in the table below). PCA was conducted on 82 items with orthogonal rotation[19] (varimax) after removing extreme multicollinearity of the data on lines with Lee & Kim, 2008.

To check if conditions preliminary to PCA are satisfied, 2 statics were obtained (Taken together, these tests provide a minimum standard which should be passed before PCA should be conducted):

1. The Kaiser-Meyer-Olkin (KMO) measure which verified the sampling adequacy for the analysis. Results showed KMO = .746 (Table 35) which is good and acceptable (Field, 2009), showing that adequacy of sample size for running PCA.
2. Bartlett's test of sphericity was obtained. This test the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is a matrix in which all of the diagonal elements are 1, and all of the diagonal elements are 0. Ideally, we want to reject this null hypothesis and conduct PCA to check for which factors can be obtained for variables. Bartlett's test of sphericity, the calculated value of χ^2 (400) = 11239.64, $p < .05$ and the critical value at 3321 degrees of freedom and 0.05 significance level is 3456.18 which is less than the calculated value. P value also indicates that significance of the value. Hence it indicates that correlation matrix is not an identity matrix and the variables are uncorrelated with the other variables included in the analysis. Therefore, PCA is appropriate.

.

Table 35: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.746
Bartlett's Test of Sphericity	Approx. Chi-Square	11239.64
	Df	3321
	Sig.	.000

The eigenvalue associated with each factor before extraction and after extraction was determined. Before extraction, SPSS 16 has identified 82 components within the dataset. The eigenvalue associated with each factor represents the amount of variance explained by that particular component (factor) and that an eigenvalue of 1 represents a substantial amount of variation. and also, it displays the eigenvalue in terms of the percentage of variance explained

[19] Orthogonal rotation ensures that factors remain uncorrelated. Within orthogonal rotation varimax rotation is selected because it maximizes the dispersion of loadings within factors. Therefore, it tries to load a smaller number of variables highly onto each factor resulting in more interpretable clusters of factors.

(Kaiser, 1960). So here factor 1 explains 11.322% of total variance. All the thirteen factors are having an eigenvalue greater than 1 were extracted. All the thirteen factors account for 50.42% of the variance.

Rotated component matrix (Table 36) is a matrix of the factor loadings for each variable onto each factor. The matrix has two components 1) Factor loadings below .4 have not been considered, 2) variables are listed in the order of the size of their factor loadings. Factor loadings ranged from 0.491-0.943 for school student data (Table 36) which is above the threshold value of 0.3 (Kim & Mueller, 1978).

Given the large sample size, and the convergence of the scree plot and Kaiser 's criterion on 13 components, this is the number of components that were retained for the final analysis.

The rotated component matrix table 36 shows the factor loading after rotation along with the name of the component. It seems that all the items of thirteen components as discussed in literature review do apply in this context. Thus, the list of items confirmed through principal component analysis represents a list of environmental variables in the context of primary school children. The list of variables comprises of: Environmental Sensitivity (ES), Environmental Values (EV), Environmental Knowledge (EK), Environmental Attitude (EA), Environmental Concern (EC), Self-Efficacy (SE), Parental Influence (PAI), Outcome Expectancies(OEC), Outcome Expectation(OE), Self-Regulation (SR), Environmental Responsibility (ER), Peer Influence (PI), Environmentally Sustainable Consumption Behaviour (ESCB)

Table 36: Rotated component matrix determining factor loading on each factor

	Factor Loading	Factor Name
I would be willing to separate trash for recycling	.581	Environmental Attitude
I have asked my parents to buy products made using extra packaging	.572	
I would be willing to save paper by using both sides of paper	.566	
I would be willing to stop buying some products that are not reusable	.564	
It upsets me when I see people use too many plastic items	.540	
It makes me happy when people recycle used bottle, cans, and paper	.536	
I properly disposed off and avoid improper disposal of trash/garbage in school, home, picnics, playgrounds, etc.	.535	Environmental Responsibility
I purchase products which are recyclable (e.g., I purchase the products on which there is/are recycling sign)	.535	
I warned my friends not to use plastic bags if not necessary	.504	
I threw material such as paper, glass, plastic cans into recycle bin	.491	
I gave old books, dress, toys, which are not used by me to other people in need	.532	
I purchased reusable pens	.513	
I enjoy the beauty and experiences related to nature.	.592	Environmental Sensitivity
Protecting the nature is important to me.	.539	
I pay attention to my consumption habits in order to protect the environment.	.756	
I pay attention to my recycling habits in order to protect environment	.634	
My Lifestyle	.624	Environmental Concern
My Future	.521	
Me/Myself	.630	
My Health	.729	
All People (in different countries)	.717	
People in my country	.706	
If someday I have free time, I would like to volunteer for recycling to help protect the environment	.554	Environmental Values
If I would have extra money I would be open to donate to protect nature	.543	
I make sure that all old newspaper is recycled when we don't need them	.629	
I would really enjoy sharing toys, stationery items or books	.630	

I try to tell others that buying reusable bottles is important	.633	
I try to save paper by writing on both sides or using one side used paper for other work	.643	
Arrange or Sort old things for donating/sharing to others (e.g., toys, books)	.535	Self-Efficacy
Learn about Eco-labels or information on products	.532	
Express your opinion about using both sides of paper for writing	.513	
Participate in recycling products such as newspaper etc.	.504	
Learn about recycling of plastic bottle	.536	
Plan your purchase of environmentally friendly product (e.g., refillable pen)	.535	
Have less garbage	.866	Outcome Expectancies
Share/Donate books/toys	.841	
Buy environmental friendly product	.876	
Have healthy environment	.869	
Have less pollution	.739	
Have less landfills/dumping grounds	.737	
Recycle bottles and cans I will have cleaner surrounding with less garbage	.576	Outcome Expectation
Purchase refillable pens I will feel better	.566	
Use both sides of paper I will feel satisfied	.463	
Participate in recycling of newspaper I will be happy	.635	
Purchase product with less packaging I will be happy	.539	
Pass old books, toys, stationery to others I will feel satisfied	.637	
Remind yourself to recycle newspaper by giving it to kabadiwala	.460	Self-Regulation
Remind yourself to write on both side of the paper instead of one side	.491	
Plan to purchase product with less packaging	.475	
Pay closer attention to pass/share toys, books to others	.466	
Plan to recycle bottles, cans instead of throwing them in dustbin	.513	
Remind yourself to purchase refillable pens than simple pen	.404	
My friends, I have the same basic beliefs regarding using both sides of paper	.761	Peer Influence
It is very important that my friends approve recycling of bottles and newspaper	.819	
My friends influence my beliefs about recycling	.808	
It is very important that my friends approve purchase of refillable pen	.833	
My friends and I do not agree about sharing of toys and books	.832	

My friends and I do not agree about purchasing products with less packaging	.858	
My beliefs about using both sides of paper for writing are the same as my parents	.610	Parental Influence
My parents and I have the same value system regarding sharing of toys, books with others	.725	
I do not care what my parents think about purchasing refillable pens	.943	
My parents do not influence my beliefs about separating glass bottles from trash	.629	
My parents do not influence my beliefs about purchase of environmentally-friendly products	.555	
My beliefs about recycling newspaper, bottles are the same as my parents	.780	
Passed toys to others	.659	Environmental Sustainable Consumption Behaviour
Bought used books	.734	
Used both sides of paper to write	.731	
Repaired bags and shoes on time so that they last longer	.564	
Passed old textbooks and storybooks to others	.765	
Borrowed or hired stationery items that you only need occasionally	.789	
Shared toys that you only need occasionally	.614	
Gave newspaper, glass tumblers/bottle cans and plastic bottles to kabadiwala (Recycle).	.487	
Bought writing paper and notebooks made from recycled paper	.641	
Bought reusable bottles and lunch box	.819	
Purchased refillable pens	.556	
Packed breakfast or lunch in washable container instead of a use and throw container	.468	
How can we reduce wastage while purchasing	.704	Environmental knowledge
Soil pollution is generally due to	.655	
One of the following does not decompose in ocean and cause harm to fish	.450	
_________ is an effective way of informing customers about the environmental impacts of the products & the choice they make while purchasing	.593	
What should you do with used glass bottles?	.694	
An item which cannot be recycled and used again is:	.762	

4.2.2. Relationship between ESCB and independent variables

I) Multiple regression between ESCB and independent variables

Multiple Regression is an extension of *simple regression* in which an outcome is predicted by a linear combination of two or more predictor variables. The form of the model is:

$$Yi = (b0 + b_1X_{1i} + b_2X_{2i} + \ldots + b_n X_{ni}) + \varepsilon i$$

in which the outcome is denoted as *Y* and each predictor is denoted as *X*. Each predictor has a regression coefficient *bi* associated with it, and *b*0 is the value of the outcome when all predictors are zero.

4.2.2.1. Assumptions of multiple regression

i)**Variables types**: All predictors and outcome variables must be quantitative, continuous. That means variables should be measured at the interval level. All 12-independent variable and one dependent variable are measured on 3 points Likert scale.

ii) **No Multicollinearity**: Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model. If there exists a perfect collinearity between predictors, it becomes impossible to obtain unique estimates of the regression coefficients because there are an infinite number of combinations of coefficients that would work equally well. One way of identifying is to scan a correlation matrix of all the predictor variables and see if any correlate. Another way is by checking it through collinearity diagnostics known as variance inflation factor (VIF) and tolerance statistics which is reciprocal of VIF. VIF value should be below 4.0 (Field, 2009). In this study, VIF value of all the predictors is from 1.063 to 1.778 (Table 41), showing non-presence of multicollinearity.

iii) **Homoscedasticity:** At each level of the predictor variables, the variance of the residual terms should be constant. It just means that the residuals at each level of the predictor should have the same variance. Leverage Statistics, h, also called *hat-value* identifies cases which influence regression model more than others; its value varies from 0 (no influence on model) to 1 (completely determines model). A rule of thumb is that cases with leverage under .2 are not a problem, but if a case has leverage over .5, the case has undue leverage (Field, 2009). The general rules of thumb we use for the measures we have discussed or identifying observations worthy for further investigation. Using the formula (2k+2)/n (where k is the number of predictors and n is the number of observations), So all values more than .04 should be a problem, but here the mean is

.012 which is less than .04, So it is ok. Table 37 shows that the leverage value does not cross danger line.

Table 37: Residuals Statistics of primary school children data

	Minimum	Maximum	Mean	Std. Deviation	N
Centered Leverage Value	.001	.151	.012	.012	649

iv) **Independent errors**: For any two observations, the residual terms should be uncorrelated (or independent). It relates to the lack of autocorrelation. This was checked using Durbin -Watson coefficient, d, which test for autocorrelation. The value of d ranges from 0 (extreme positive autocorrelation) to 4 (extreme negative correlation). Values close to 2 indicate no serial autocorrelation. As a rule of thumb, d should be between 1.5 and 2.5 to indicate independence of observations. Table 40 displays d = 1.746. Hence no problem of autocorrelation is found.

v) **Normally distributed errors:** A histogram of standardized residuals showed a roughly normal curve[20] (Figure 13). Central limit theorem assures that even when an error is not normally distributed when the sample size is large, the sampling distribution of b coefficient will still be normal. Therefore, violations of this assumption usually have little/no impact on a conclusion for large samples. In the present study, the sample size is 649, which is fairly large and reliance on central limit theorem takes care of this assumption.

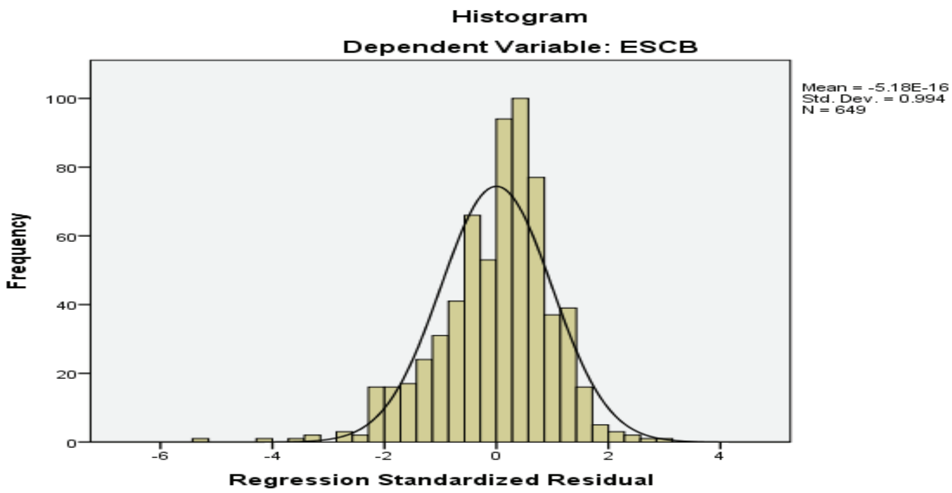


Figure 13: Histogram of standardized residual of Primary school children

[20] An alternative for the same purpose is the normal probability plot, with the observed cumulative probabilities of occurrence of the standardized residuals on the Y axis and of expected normal probabilities of occurrence on the x axis, such that a 45-degree line will appear when observed conforms to normally expected.

vi) **Linearity:** Similar to other studies on consumption behavior, linearity between the dependent variable and independent variables has been assumed.

vii) **Independence:** It is assumed that all the values of the outcome variable are independent

a) Descriptive statistics

Table 38 provides the mean and standard deviations of each variable in the dataset. For example, the mean for ESCB was 2.69 on a scale of 3 for all primary school children from private and government schools in the sample. N is 649, as 649 children acted as respondents for the data collection.

The correlation matrix table 39 of primary school children shows two things: a) the value of Pearson's correlation coefficient between every pair of variables (e.g., we can see that the ESCB had a large positive correlation with self-regulation, $r = .531$) b) one-tailed significance of each unique pair of correlation (of dependent variable with each independent variable) is displayed (e.g., correlation above .05 is significant, $p < .05$).

Table 38: Descriptive Statistics of primary school data

	Mean	Std. Deviation	N
ESCB	2.6939	.32303	649
EA	1.5244	.35374	649
ES	2.5146	.63691	649
EK	.3875	.24883	649
ER	2.4122	.42862	649
EV	2.6800	.38844	649
EC	2.7899	.36342	649
SE	2.7088	.33208	649
OE	2.6793	.37125	649
OEC	2.5776	.35060	649
SR	2.6482	.38155	649
PI	2.5760	.42678	649
PAI	2.5560	.43374	649
Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.			

Findings related to correlation coefficients of IVs with ESCB

1. All have significant correlations except environmental knowledge (r = .026, p = .253), Self-regulation is the most correlated followed with environmental value, peer influence, outcome expectation, parental influence, self-efficacy, outcome expectancies, environmental concern, environmental responsibility, environmental sensitivity and environmental attitude to be less correlated.
2. We can also see that out of all the independent variable self-regulation correlates best with the dependent variable, i.e., ESCB ($r = .531, p < .05$) so it is likely that this variable will best predict ESCB.
3. Dependent variable, i.e., ESCB least correlates with environmental knowledge and is insignificant ($r = .026, p > .05$) hence it is likely that this variable will not predict ESCB.

Table 39: Correlations between IV and DV for primary school children

		ESCB	**SIGNIFICANCE**
Pearson Correlation	ESCB	1.000	
	EA	**.144**	**.000**
	ES	**.152**	**.000**
	EK	.026	.253
	ER	**.263**	**.000**
	EV	**.442**	**.000**
	EC	**.282**	**.000**
	SE	**.384**	**.000**
	OE	**.414**	**.000**
	OEC	**.325**	**.000**
	SR	**.531**	**.000**
	PI	**.431**	**.000**
	PAI	**.394**	**.000**
Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.			

b) Summary of Model

This section discusses the overall model that comprises all the independent variable that helps in predicting the dependent variable ESCB. Backward elimination method for multiple regression has been used here. Backward elimination method involves starting with all candidate variables, testing the deletion of each variable using a chosen model fit criterion, deleting the variable (if any) whose loss gives the most statistically insignificant deterioration of the model fit, and repeating this process until no further variables can be deleted without a statistically significant loss of fit.

Backward elimination scores more over forward method is owing to suppressor effect. The forward method produces so-called suppressor effects. These suppressor effects occur when predictors are only significant when another predictor is held constant. Thus, backward approach runs less risk of making type II error (missing a predictor that does, in fact, predict the outcome) (Field, 2009). This generated five models. Table 40 provides the model summary.

Important information about the model is the value three important statics[21]: R, R square, and the adjusted R square. Durbin -Watson value is also represented in Table 40. This value informs us about whether the assumption of independent errors is acceptable. The value less than 1 or greater than 3 is not acceptable (Field, 2009). A value closer to 2 is better, and for the primary school children's data, the value is 1.746. The column labeled R are the values of multiple correlation coefficients between the independent and the dependent variable. When all the independent variables are used in the Model 1, the simple correlation between dependent and all the independent variables is .654. But as we have adopted backward elimination method, the insignificant independent variable from the model is dropped, and another model is developed. In primary school data, five models were developed. The final model where parental influence, environmental sensitivity, environmental concern, self-efficacy, environmental value, peer influence, outcome expectation, and self-regulation are found to be significant predictors of the dependent variable have correlation value .651 which is highly positive.

The second column in table 40 for primary school children when all the predictors of the first model were considered give us the value of R^2 as .427 which means that all the twelve predictors account for 42.7% of the variation in ESCB. However, when the insignificant predictors namely outcome expectancies, environmental knowledge, environmental responsibility, and

[21] R represents multiple correlation coefficients. It is a correlation between the observed values of Y and the values of Y predicted by the multiple regression model.
R square represents amount of variance in the outcome explained by the model

environmental attitude were dropped from the model [22]R^2 value decreases to .424 or 42.4% of the variance in ESCB which means that all the eight significant predictors account for 42.4% of the variation in ESCB. Therefore, exclusion of insignificant predictors has not accounted many variations in ESCB

The next column, i.e., adjusted R^2 compares the explanatory power of regression models that contain different numbers of predictors, and ideally, its value has to be same, or very close to, the value of R^2. In our study, the difference for the final model is small (.424-.416 = .008 i.e. about .8%). This means that if the model were derived from the population rather than the sample, it would account for approximately .8% less variance in the outcome.

Table 40: Model Summary[f] for primary school children's data

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.654[a]	.427	.416	.24679	.427	39.518	12	636	.000	
2	.654[b]	.427	.417	.24660	.000	.014	1	636	.906	
3	.653[c]	.427	.418	.24642	.000	.085	1	637	.770	
4	.653[d]	.426	.418	.24644	-.001	1.107	1	638	.293	
5	.651[e]	.424	.416	.24676	-.002	2.648	1	639	.104	1.746

a. Predictors: (Constant), PAI, ES, EA, EK, EC, ER, SE, OEC, EV, PI, OE, SR
b. Predictors: (Constant), PAI, ES, EA, EK, EC, ER, SE, EV, PI, OE, SR
c. Predictors: (Constant), PAI, ES, EA, EC, ER, SE, EV, PI, OE, SR
d. Predictors: (Constant), PAI, ES, EA, EC, SE, EV, PI, OE, SR
e. Predictors: (Constant), PAI, ES, EC, SE, EV, PI, OE, SR
f. Dependent Variable: ESCB

Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.

[22] Typically values of R^2 below .11 are considered to signal a case where results are real but probably not practically important and it is against this criterion that strength of R^2 was checked.

As in multiple regression, the model takes the form of the equation, and in that equation, there are several unknown quantities (the unstandardized coefficients[23] and standardized coefficients[24] b-values) which are present in the linear equation.

To see if statistics for constant should be included in explanation; theory was checked which says that most multiple regression models include a constant term, since this ensures that model will be "unbiased"-i.e. means of residuals[25] will be exactly zero; and that if sum of squared errors is to be minimized, constant must be chosen such that the mean errors is zero. In simple regression, constant represents the Y-intercept of the regression line, in unstandardized form; while in multiple regression models, it represents a value that would be predicted for a dependent variable if all independent variables were simultaneously equal to zero. In addition, ensuring that in—sample errors are unbiased, the presence of constant allows the regression line to "seek its own level" and provide the best fit to data that may only be "locally" linear. Therefore, the constant was included in the analysis.

The significance of beta coefficient of constant was < 0.05, and therefore considered statistically significant. The unstandardized beta for constant = .504, meaning that if all independent variables were simultaneously equal to zero, then the value that would be predicted for environmentally sustainable consumption behaviour will be = unstandardized beta coefficients of constant.

The first part of the table 41 gives us the estimates of this b- values. These b-values (unstandardized) indicate the individual contribution of each independent variable to the model. We can define the model as follows:

ESCB = .504 + .186 SR +.125 EV+ .117 PI + .117 PAI + .107 OE+ .077 SE +.062 EC +.037 ES

---

[23] The unstandardized coefficients b-value tells us about the relationship between predictor and the outcome variable. If value is positive it states positive relationship, whereas negative coefficients represents negative relationship.

[24] The standardized coefficients b-value tells the number of standard deviations that the outcome will change as a result of one standard deviation change in the predictor (Field…)

[25] Coefficients in a regression model are estimated by "least squares" minimizing mean squared error. Now mean squared error is equal to variance of errors plus square of their mean: this is a mathematical identity. Changing the value of constant in model changes mean of errors but doesn't affect variance.

SR = Self- Regulation, EV= Environmental Value, PI= Peer Influence, PAI = Parental Influence, OE = Outcome Expectation, SE = Self-Efficacy, EC = Environmental Concern, ES = Environmental Sensitivity.

The b-values tells us about the relationship between ESCB and each independent variable on 2 counts:

a) Direction: whether the relationship between dependent and independent variable is positive or negative. Positive relationship indicates a rise in dependent variable when independent variable increases and negative relationship indicates a decrease in dependent variable with an increase in independent variable

b) Score: it represents the degree each predictor affects the outcome of the effects of all other predictors are held constant. As the values are positive, we can tell that there is a positive relationship between the independent and dependent variable. Positive values resulted for all the eight-independent variables, namely, self-regulation, environmental value, peer influence, parental influence, outcome expectation, self-efficacy, environmental concern, environmental sensitivity.

Thus, as self-regulation increases, ESCB increases; similarly, as environmental value, peer influence, parental influence, outcome expectation, self-efficacy, environmental concern, environmental sensitivity increases, ESCB increases.

The b-values also tell us to what degree each independent variable affects the dependent if the effect of all other independent variables is held constant. Here in the above model b-value indicates that if the self-regulation is increased by one unit, then additional increase in ESCB will be by .186 units. This interpretation is true only if the effects of other independent variables are held constant. Similarly, for other variables, a unit change in the particular independent variable keeping other variables constant will bring change in ESCB with respect to the b value.

T- test value in the above table determines whether the predictor is making a significant contribution to the model (which is parallel to what is exhibited by the value of significance: smaller the value of *Sig*[26] *{and the larger the value of t})*, the greater the contribution of that independent variable.

---

[26] When significance value of B is .05, it actually means that odds of getting these sample results by chance if b were really zero would be less than 5 in 100 samples. This is a very rare event, and in such cases if direction of observed relationship between independent and dependent variables is same as expected, null hypothesis that b is zero is rejected and alternative i.e. that absolute value of b is something greater than zero is accepted.

For the above given model, self-regulation (t(649)=5.482, p<.05), environmental value (t(649)=4.238, p<.05), peer influence (t(649)=4.285, p<.05), parental influence (t(649)=4.572, <.05), outcome expectation (t(649)=3.368, p<.05), self-efficacy (t(649)=2.219, p<.05), environmental concern (t(649)=2.180, p<.05), environmental sensitivity (t(649)=2.339, p<.05).

Standardized beta values tell us the number of standard deviation that the dependent variable will change as a result of one standard deviation change in the independent variable. The standardized beta values of self-regulation (.219), environmental value (.151), peer influence (.155), parental influence (.157), outcome expectation (.123), self-efficacy (.079), environmental concern (.070), environmental sensitivity (.072). To interpret these values, we need to know the standard deviations of all the variables in this model. These values can be seen from descriptive table 1 The standard deviation for each variable is: self-regulation (.38), environmental value (.38), peer influence (.42), parental influence (.43), outcome expectation (.37), self-efficacy (.33), environmental concern (.36), environmental sensitivity (.63). For self-regulation, the standardized beta value is .219, which indicates that as self-regulation is increased by one standard deviation, ESCB increases by .219 standards deviation. The standard deviation of self-regulation was .38, and so this constitutes a change of .0832 in the score of behaviour (.219 * .38).

Table 41: Coefficients[a] IV for primary school children

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
5 (Constant)	.504	.112		4.494	.000		
ES	.037	.016	.072	2.339	.020	.941	1.063
EV	.125	.030	.151	4.238	.000	.711	1.406
EC	.062	.029	.070	2.180	.030	.869	1.150
SE	.077	.035	.079	2.219	.027	.712	1.405
OE	.107	.032	.123	3.368	.001	.671	1.491
SR	.186	.034	.219	5.482	.000	.563	1.778
PI	.117	.027	.155	4.285	.000	.691	1.448
PAI	.117	.026	.157	4.572	.000	.766	1.305

a. Dependent Variable: ESCB

Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.

From the table 41 last columns named "collinearity statistics" checks the assumption of multicollinearity. According to the researcher (Field,2009) if largest VIF is greater than 10 then there is a cause for concern. In our case, all the values of predictors are less than 10. Similarly, if tolerance value is below .2, it indicated a problem. Here it indicates all the value above .563 hence we can safely conclude that there is no multicollinearity. Table 42 gives us the estimates of this b- values of variables that are found insignificant predictor of ESCB. From the table 42, we can see that all the insignificant predictors are positively related to ESCB

From the magnitude of the t statistics, we can see that self-regulation has the highest impact followed by parental influence, peer influence, environmental value, outcome expectation, environmental sensitivity, self-efficacy, environmental concern.

Table 42: Excluded variables Coefficients[a] for primary school children

Model	B	T	sig	Tolerance
OEC	.008	.232	.817	.670
EK	.004	.135	.892	.936
ER	.039	1.171	.242	.821
EA	.052	1.627	.104	.882
a. Dependent Variable: ESCB Where, OEC = Outcome expectancies, EK = Environmental Knowledge, ER = Environmental Responsibility, EA = Environmental Attitude				

Finally, on the basis of results, accept-reject decisions for hypothesis were made. Table 43 gives detail about the hypothesis results.

Table 43: Coefficients of excluded Independent variable for primary school children

S.No	Variable Name	Unstandardized B coefficients	Significance	Relationships Exp.	Obs.	Hypothesis accepted/rejected
1	Environmental Attitude	.052	.104	+	+	Rejected
2	Environmental Sensitivity	.037	.020*	+	+	Accepted
3	Environmental Knowledge	.004	.936	+	+	Rejected
4	Environmental Responsibility	.039	.821	+	+	Rejected
5	Environmental Concern	.062	.030*	+	+	Accepted
6	Environmental Value	.125	.000*	+	+	Accepted
7	Self-efficacy	.077	.027*	+	+	Accepted
8	Outcome Expectation	.107	.001*	+	+	Accepted
9	Outcome Expectancies	.008	.817	+	+	Rejected
10	Self-Regulation	.186	.000*	+	+	Accepted
11	Peer Influence	.117	.000*	+	+	Accepted
12	Parental Influence	.117	.000*	+	+	Accepted
*significant at p < .05						

4.2.2.2. Findings:

1) All the five models were significant, but all the predictors in each model were not significant. Hence only 5th model 5 was considered for the study where eight predictors were found significant.
2) Self-regulation, Environmental value, Peer Influence, Parental Influence, outcome expectation, Self-Efficacy, Environmental Concern and Environmental Sensitivity are found as the most significant predictors of ESCB among primary school children, in the same order.
3) Environmental Attitude, Environmental Knowledge, Environmental Responsibility and outcome expectancies are found as nonsignificant predictors of ESCB among primary school children.
4) Among significant predictors Self-regulation, Environmental value and Peer Influence were found to be highly correlated to ESCB.
5) As the non-significant predictors were removed from model 1 to model 5 multiple correlations got changed from .651 to .654 which is very non-significant, i.e., just .003
6) Also, as the non-significant predictors were removed from model 1 to model 5 R square got changed .427 to .424 which is again very minute, i.e., .003
7) Adjusted R square remain unchanged from model 1 to model 5 (.416). The value shows model to be moderately strong goodness of fit

4.2.3. Separate results for private and government school

Given that the type of school was shown by literature as an important demographic factor, although mixed results have been seen in previous studies (some studies showing significant difference between the two types of school with respect to ESCB or related constructs findings while others did not find any significant difference (Tuncer et al., 2005; Kopnina, 2011)), therefore as an extension of the main objective it was attempted to check if such differences in the influence of IVs on ESCB existed for private vs. government schools.

In the first step assumptions of multiple regression were checked on data. Next Multiple Regression and backward elimination method were run.

4.2.3.1. Assumptions of multiple regression

1. **Variables types:** All predictors and outcome variables must be quantitative, continuous. That means variables should be measured at the interval level. All 12-independent variable and one dependent variable are measured on 3 points Likert scale.
2. **No multicollinearity** assumption was identified by variance inflation factor (VIF). The value of all the independent variable should be below the cutoff limit of 4.0. We can see that VIF values are from 1.153 to 1.887 (table 52) for private school children and VIF values are from 1.062 to 1.709 (table 54) for government school showing non-presence of multicollinearity.
3. A histogram of standardized residuals showed a roughly normal curve in figure 14 for private school and figure 15 for a government school. Central limit theorem assures that even when an error is not normally distributed when the sample size is large, the sampling distribution of b-coefficient will still be normal. Therefore, violations of this assumption usually have no impact on conclusions for large samples. In present study sample size is 354 children for private and 286 for government., are fairly large, and reliance on central limit theorem takes care of this assumption.

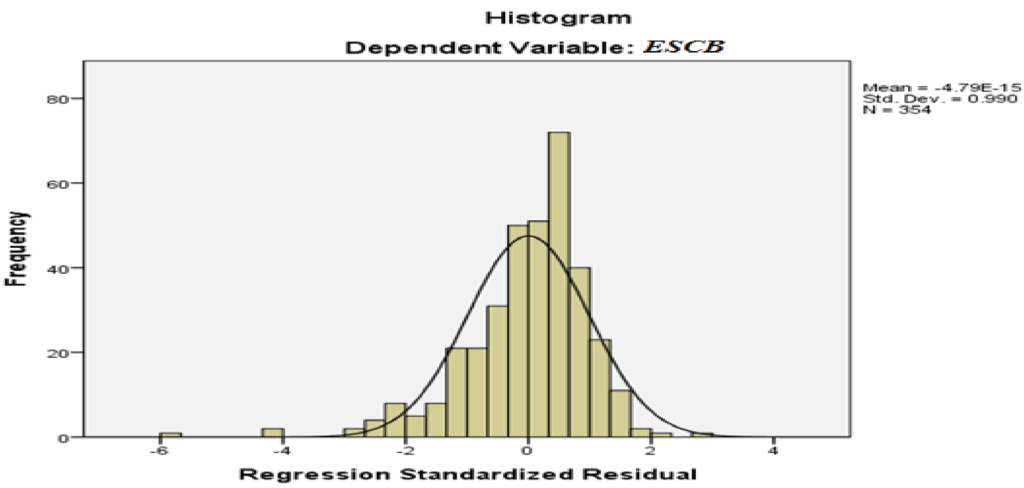


Figure 14: Histogram of standardized residual of Private school children

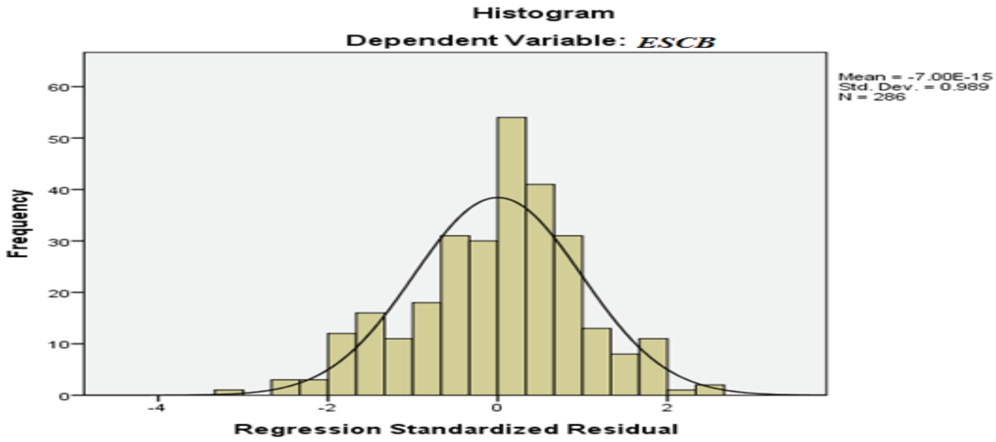


Figure 15: Histogram of standardized residual of Government school children

4. **Homoscedasticity:** Leverage Statistics, h, also called *hat-value* identifies cases which influence regression model more than others; A rule of thumb is that cases with leverage under .2 are not a problem, but if a case has leverage over .5, the case has undue leverage. The general rules of thumb we use for the measures we have discussed or identifying observations worthy of further investigation. Using the formula (2k+2)/n (where k is the number of predictors and n is the number of observations), So all values more than .07 for private and .09 for government school should be a problem, but here the mean is .017 which is less than .07, for private and for government it is .021 which is less than .09. So, it is ok. Table 44 for private school children and Table 45 for government school children shows that the leverage value does not cross danger line.

Table 44: Residuals Statistics (Private)

	Minimum	Maximum	Mean	Std. Deviation	N
Centered Leverage Value	.002	.106	.017	.015	363

Table 45: Residuals Statistics (Government)

	Minimum	Maximum	Mean	Std. Deviation	N
Centered Leverage Value	.002	.135	.021	.021	286

5. **Independent Error**: This was checked using Durbin -Watson coefficient, d, which test for autocorrelation. The value of d ranges from 0 (extreme positive autocorrelation) to 4 (extreme negative correlation). Values close to 2 indicate no serial autocorrelation. As a

rule of thumb, d should be between 1.5 and 2.5 to indicate independence of observations. Table 50 displays d = 1.860 for private school children and Table 52 displays d = 1.732 value for government school children, hence no problem of autocorrelation.

6. **Linearity**: Similar to other studies on consumption behavior, linearity between the dependent variable and independent variables has been assumed.
7. **Independence:** It is assumed that all the values of the outcome variable are independent

a) Descriptive

The table 46 for private school children and table 47 for government school children provides the mean and standard deviation of each variable in our dataset. For example, the mean for ESCB was 2.72 for private school children and 2.66 for government school children on a scale of 3. N is 354 for private school and 286 for a government school, they acted as respondents for the data collection.

Table 46: Descriptive Statistics (Private)

	Mean	Std. Deviation	N
ESCB	2.72	.299	354
EA	1.48	.314	354
ES	2.67	.546	354
EK	.42	.268	354
ER	2.44	.424	354
EV	2.74	.372	354
EC	2.81	.339	354
SE	2.77	.293	354
OE	2.72	.334	354
OEC	2.61	.304	354
SR	2.69	.358	354
PI	2.55	.419	354
PAI	2.54	.406	354

Table 47: Descriptive Statistics (Government)

	Mean	Std. Deviation	N
ESCB	2.66	.340	286
EA	1.54	.362	286
ES	2.31	.685	286
EK	.34	.214	286
ER	2.36	.432	286
EV	2.61	.385	286
EC	2.76	.378	286
SE	2.63	.359	286
OE	2.62	.400	286
OEC	2.53	.398	286
SR	2.59	.397	286
PI	2.61	.432	286
PAI	2.55	.430	286

Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.

The correlation matrix table 48 of private school children shows two things: a) the value of Pearson's correlation coefficient between every pair of variables (e.g., we can see that the ESCB had a large positive correlation with self-regulation, r = .581) b) one-tailed significance of each unique pair of correlation (of dependent variable with each independent variable) is displayed (e.g., correlation above is significant, $p < .05$).

Findings related to correlation coefficients of IVs with ESCB among private school children

1. All have significant correlations except environmental knowledge (r = .026, p = .253), Self-regulation is the most correlated followed with environmental value, self-efficacy, outcome expectation, parental influence, peer influence, outcome expectancies, environmental sensitivity environmental responsibility, environmental attitude environmental concern, to be less correlated.

Table 48: Correlations between IV and DV for private school children

		ESCB	SIGNIFICANCE
Pearson Correlation	ESCB	1.000	
	EA	.248	.000
	ES	.269	.000
	EK	.022	.337
	ER	.259	.000
	EV	.508	.000
	EC	.179	.000
	SE	.462	.000
	OE	.447	.000
	OEC	.343	.000
	SR	.581	.000
	PI	.364	.000
	PAI	.383	.000
Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.			

2. We can also see that out of all the independent variable self-regulation correlates best with the dependent variable, i.e., ESCB (r = .581, $p < .05$) so it is likely that this variable will best predict ESCB.

3. Dependent variable, i.e., ESCB least correlates with environmental knowledge and is insignificant (r = .022, p > .05) hence it is likely that this variable will not predict ESCB.

The correlation matrix table 49 of government school children shows two things: a) the value of Pearson's correlation coefficient between every pair of variables (e.g., we can see that the ESCB had a large positive correlation with parental influence, r = .522) b) one-tailed significance of each unique pair of correlation (of dependent variable with each independent variable) is displayed (e.g., correlation above is significant, p < .05).

Findings related to correlation coefficients of IVs with ESCB among government school children

1. All have significant correlations except three independent variables environmental knowledge (r = .026, p = .253), environmental sensitivity, and environmental attitude. Parental Influence is the most correlated followed with self-regulation, environmental concern, outcome expectation, environmental value, outcome expectancies, self-efficacy, environmental responsibility to be less correlated.

Table 49: Correlations between IV and DV for government school children

		ESCB	SIGNIFICANCE
Pearson Correlation	ESCB	1.000	
	EA	.014	.406
	ES	.017	.385
	EK	.024	.345
	ER	.241	.000
	EV	.331	.000
	EC	.407	.000
	SE	.287	.000
	OE	.359	.000
	OEC	.307	.000
	SR	.478	.000
	PI	.502	.000
	PAI	.522	.000
Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.			

2. We can also see that out of all the independent variable parental influence correlates best with the dependent variable, i.e., ESCB ($r = .522$, $p < .05$) so it is likely that this variable will best predict ESCB.
3. Dependent variable, i.e., ESCB least correlates with environmental attitude and is insignificant ($r = .014$, $p > .05$) hence it is likely that this variable will not predict ESCB.

b) Summary of model

This section discusses the overall model that comprises all the independent variable that helps in predicting dependent variable ESCB. Backward elimination method for multiple regression has been used here. Backward elimination method involves starting with all candidate variables, testing the deletion of each variable using a chosen model fit criterion, deleting the variable (if any) whose loss gives the most statistically insignificant deterioration of the model fit, and repeating this process until no further variables can be deleted without a statistically significant loss of fit. Backward elimination scores more over forward method is owing to suppressor effect. The forward method produces so-called suppressor effects. These suppressor effects occur when predictors are only significant when another predictor is held constant. Thus, backward approach runs less risk of making type II error (missing a predictor that does, in fact, predict the outcome) (Field, 2009). This generated see six models for private school and seven models for government school children. Table 50 and Table 51 is the model summary for private school children and government school children.

Important information about the model is the value of R, R^2, and the adjusted R^2. Durbin - Watson value is also represented in table 50 and 51. This value informs us about whether the assumption of independent errors is acceptable. The value less than 1 or greater than 3 is not acceptable (Field, 2009). A value closer to 2 is better, and for the private school children's data the value is 1.860, and for government school children's data, the value is 1.732. When all the independent variables are used in the Model 1 the simple correlation between dependent and all the independent variables is .692 for private school children data and .669 for government school children.

Table 50: Model Summary[g] (for private school children)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.692[a]	.480	.461	.21973	.480	26.184	12	341	.000	
2	.692[b]	.480	.463	.21942	.000	.010	1	341	.020	
3	.692[c]	.479	.464	.21910	.000	.029	1	342	.865	
4	.692[d]	.479	.466	.21883	.000	.134	1	343	.714	
5	.692[e]	.478	.466	.21874	-.001	.731	1	344	.003	
6	.690[f]	.476	.465	.21897	-.003	1.727	1	345	.000	1.860

a. Predictors: (Constant), PAI, ER, EC, EA, OEC, ES, EK, SE, OE, PI, EV, SR
b. Predictors: (Constant), PAI, ER, EC, OEC, ES, EK, SE, OE, PI, EV, SR
c. Predictors: (Constant), PAI, ER, EC, OEC, ES, SE, OE, PI, EV, SR
d. Predictors: (Constant), PAI, ER, OEC, ES, SE, OE, PI, EV, SR
e. Predictors: (Constant), PAI, ER, OEC, SE, OE, PI, EV, SR
f. Predictors: (Constant), PAI, ER, SE, OE, PI, EV, SR
g. Dependent Variable: mean_14
Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence.

But as we have adopted backward elimination method, the insignificant independent variable from the model is dropped, and another model is developed. In private school data, 6 models were developed. The final model where parental influence, environmental responsibility, self-efficacy, outcome expectation, peer influence, environmental value, and self-regulation are found to be significant predictors of the dependent variable have correlation value .690 which is highly positive. Similarly, as we have adopted backward elimination method, the insignificant independent variable from the model is dropped, and another model is developed. In government school data seven models were developed. The final model where parental influence, environmental attitude, environmental concern, outcome expectation, peer influence, and self-regulation are found to be significant predictors of the dependent variable have correlation value .663 which is highly positive.

Table 51: Model Summary[h] (government school)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.669[a]	.448	.424	.2587762	.448	18.469	12	273	.000	
2	.669[b]	.448	.426	.2583131	.000	.020	1	273	.887	
3	.669[c]	.448	.428	.2578544	.000	.024	1	274	.876	
4	.669[d]	.448	.430	.2574438	.000	.122	1	275	.727	
5	.669[e]	.447	.431	.2570794	.000	.216	1	276	.642	
6	.666[f]	.444	.430	.2574447	-.004	1.791	1	277	.182	
7	.663[g]	.440	.428	.2579074	-.004	2.004	1	278	.158	1.732

a. Predictors: (Constant), PAI, ES, EA, EK, EC, ER, SE, EV, OE, OEC, PI, SR
b. Predictors: (Constant), PAI, ES, EA, EK, EC, ER, SE, EV, OE, PI, SR
c. Predictors: (Constant), PAI, ES, EA, EC, ER, SE, EV, OE, PI, SR
d. Predictors: (Constant), PAI, ES, EA, EC, SE, EV, OE, PI, SR
e. Predictors: (Constant), PAI, ES, EA, EC, EV, OE, PI, SR
f. Predictors: (Constant), PAI, EA, EC, EV, OE, PI, SR
g. Predictors: (Constant), PAI, EV, EC, OE, PI, SR
h. Dependent Variable: ESCB
Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence

The second column in Table 50 for private school children when all the predictors of the first model were considered give us the value of R^2 as .480 for private school children which mean that all the twelve predictors account for 48.0% of the variation in ESCB. However, when the insignificant predictors namely environmental attitude, environmental sensitivity, environmental knowledge, environmental concern, outcome expectancies were dropped from the model, this value decreases to .476 or 47.6% of the variance in ESCB which means that all the eight significant predictors account for 47.6% of the variation in ESCB. Therefore, exclusion of insignificant predictors has not accounted many variations in ESCB

The next column, i.e., adjusted R^2 compares the explanatory power of regression models that contain different numbers of predictors, and ideally, its value has to be same, or very close to, the value of R^2. In our study, the difference for the final model is small (.476-.465 = .011 i.e. about

11%). This means that if the model were derived from the population rather than the sample, it would account for approximately 11% less variance in the outcome.

Similarly, the second column in table 51 for government school children when all the predictors of the first model were considered give us the value of R^2 as .448 for government school children which mean that all the twelve predictors account for 44.8% of the variation in ESCB. However, when the insignificant predictors namely environmental attitude, environmental sensitivity, environmental knowledge, environmental responsibility, self-efficacy, outcome expectancies were dropped from the model, this value decreases to .440 or 44.0% of the variance in ESCB which means that all the eight significant predictors account for 44.0% of the variation in ESCB. Therefore, exclusion of insignificant predictors has not accounted many variations in ESCB

The next column, i.e., adjusted R^2 compares the explanatory power of regression models that contain different numbers of predictors, and ideally, its value has to be same, or very close to, the value of R^2. In our study, the difference between adjusted R^2 for the final model is small (.440-.428 = .012, i.e., about 12%). This means that if the model were derived from the population rather than the sample, it would account for approximately 12% less variance in the outcome.

The multiple regression the model takes the form of the equation, and in that equation, there are several unknown quantities (the unstandardized coefficients[27] and standardized coefficients[28] b-values) which are present in the linear equation. To see if statistics for constant should be included in explanation; theory was checked which says that most multiple regression models include a constant term, since this ensures that model will be "unbiased"-i.e. means of residuals[29] will be exactly zero; and that if sum of squared errors is to be minimized, constant must be chosen such that the mean errors is zero. In simple regression, constant represents the Y-intercept of the regression line, in unstandardized form; while in multiple regression models, it represents a value that would be predicted for a dependent variable if all independent variables

[27] The unstandardized coefficients b-value tells us about the relationship between predictor and the outcome variable. If value is positive it states positive relationship, whereas negative coefficients represents negative relationship.

[28] The standardized coefficients b-value tells the number of standard deviations that the outcome will change as a result of one standard deviation change in the predictor (Field…)

[29] Coefficients in a regression model are estimated by "least squares" minimizing mean squared error. Now mean squared error is equal to variance of errors plus square of their mean: this is a mathematical identity. Changing the value of constant in model changes mean of errors but doesn't affect variance.

were simultaneously equal to zero. In addition, ensuring that in—sample errors are unbiased, the presence of constant allows the regression line to "seek its own level" and provide the best fit to data that may only be "locally" linear. Therefore, the constant was included in the analysis. The significance of beta coefficient of constant was < 0.05, and therefore considered statistically significant. The unstandardized beta for constant = .426, for private school children and .455 for government school children meaning that if all independent variables were simultaneously equal to zero, then the value that would be predicted for environmentally sustainable consumption behaviour will be = unstandardized beta coefficients of constant.

The first part of table 52 for private school children gives us the estimates of this b- values. These b-values (unstandardized) indicate the individual contribution of each independent variable to the model.

We can define the model as follows:

ESCB = .426 + .210 SR+.170 SE + .135 EV + .121 OE +.100 PAI + .066 PI + .058 ER

SR= Self-Regulation, SE = Self-Efficacy, EV= Environmental Value, OE = Outcome Expectation, PAI = Parental Influence, PI= Peer Influence and ER = Environmental Responsibility

The b-values tells us about the relationship between ESCB and each independent variable on 2 counts:

a) **Direction:** whether the relationship between dependent and independent variable is positive or negative. Positive relationship indicates rise in dependent variable when independent variable increases and negative relationship indicates decrease in dependent variable with increase in independent variable.
b) **Score**: it represents the degree each predictor affects the outcome of the effects of all other predictors are held constant.

As the values are positive, we can tell that there is a positive relationship between the independent and dependent variable. Positive values resulted for all the seven-independent variable namely, environmental responsibility, environmental value, self-efficacy, outcome expectation, self-regulation, peer influence and parental influence results positive relationship with ESCB

Thus, like environmental responsibility increases, ESCB increase; as environmental value, self-efficacy, outcome expectation, self-regulation, peer influence and parental influence increases ESCB increase.

The b-values also tell us to what degree each independent variable affects the dependent if the effect of all other independent variables is held constant. Here in the above model b-value indicates that if the environmental responsibility is increased by one unit, then the additional change in ESCB will be by .058 units. This interpretation is true only if the effects of other independent variables are held constant. Similarly, for other variables, a unit change in the particular independent variable keeping other variables constant will bring change in ESCB with respect to the b value.

Table 52: Coefficients[a] of independent variable (private school children)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
6	(Constant)	.426	.141		3.029	.003	.149	.703		
	ER	.058	.029	.082	1.966	.050	.000	.116	.867	1.153
	EV	.135	.039	.168	3.440	.001	.058	.212	.635	1.576
	SE	.170	.046	.167	3.671	.000	.079	.261	.734	1.363
	OE	.121	.043	.135	2.809	.005	.036	.206	.656	1.525
	SR	.210	.045	.251	4.693	.000	.122	.298	.530	1.887
	PI	.066	.034	.093	1.964	.050	.000	.133	.679	1.473
	PAI	.100	.033	.135	3.017	.003	.035	.164	.757	1.321

Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence

T- test value in the above table determines whether the predictor is making a significant contribution to the model (which is parallel to what is exhibited by the value of significance: smaller the value of *Sig*[30] *{and the larger the value of t})*, the greater the contribution of that independent variable.

---

[30] When significance value of B is .05, it actually means that odds of getting these sample results by chance if b were really zero would be less than 5 in 100 samples. This is a very rare event, and in such cases if direction of observed

For the above given model, environmental responsibility (t(345)=1.96, p<.05), environmental value (t(345)=3.440, p<.05), self-efficacy (t(345)=3.67, p<.05), outcome expectation (t(345)=2.80, p<.05), self-regulation (t(345)=4.69, p<.05), peer influence (t(345)=1.96, p<.05) and parental influence (t(345)=3.07, p<.05).

Standardized beta values tell us the number of standard deviation that the dependent variable will change as a result of one standard deviation change in the independent variable. The standardized beta values of environmental responsibility (.082), environmental value (.168), self-efficacy (.167), outcome expectation (.135), self-regulation (.251), peer influence (.093) and parental influence (.135). To interpret these values, we need to know the standard deviations of all the variables in this model. These values can be seen from descriptive table 46. For environmental responsibility, the standardized beta value is .082, which indicates that as responsibility is increased by one standard deviation, ESCB increases by .082 standards deviation. The standard deviation of environmental responsibility was .424, and so this constitutes a change of .0347 in the score of behaviour (.424 * .082).

From the table 52 last columns named "collinearity statistics" checks the assumption of multicollinearity. According to the researcher (Field,2009; Bowerman, 1990; Myers, 1990) if largest VIF is greater than 10 then there is a cause for concern. In our case, all the values of predictors are less than 10. Similarly, if tolerance value is below .2, it indicated a problem. Here it indicates all the value above .530 hence we can safely conclude that there is no multicollinearity.

From the magnitude of the t statistics, we can see that self-regulation has the highest impact followed by self-efficacy, environmental value, parental influence, outcome expectation, peer influence, environmental responsibility.

4.2.3.2. Findings for private school children:

1) All the six models for private school children were significant, but all the predictors were not significant. Hence only 6th model was considered for the study where seven predictors were found significant.

---

relationship between independent and dependent variables is same as expected, null hypothesis that b is zero is rejected and alternative i.e that absolute value of b is something greater than zero is accepted.

2) Self-regulation, Self-Efficacy, Environmental value, Outcome expectation, Parental Influence, Peer Influence and Environmental responsibility are found as the most significant predictors of ESCB among private primary school children
3) Environmental Attitude, Environmental Knowledge, Environmental concern, environmental sensitivity and Outcome expectancies are found as nonsignificant predictors of ESCB among private primary school children.
4) Among significant predictors Self-regulation, Self-Efficacy and Environmental value were found to be highly correlated to ESCB.
5) As the non-significant predictors were removed from model 1 to model 6 multiple correlations got changed from .692 to .690 which is very non-significant, i.e., just .002

Table 53: Relationship of IV with DV among private school children.

S.No	Variable Name	Unstandardized B coefficients	Significance	Relationships Exp.	Obs.
1	Environmental Attitude	.029	.507	+	+
2	Environmental Sensitivity	.020	.626	+	+
3	Environmental Knowledge	.015	.703	+	+
4	Environmental Responsibility	.058	.050*	+	+
5	Environmental Concern	.005	.892	+	+
6	Environmental Value	.135	.001*	+	+
7	Self-efficacy	.170	.000*	+	+
8	Outcome Expectation	.121	.005*	+	+
9	Outcome Expectancies	.048	.274	+	+
10	Self-Regulation	.210	.000*	+	+
11	Peer Influence	.066	.050*	+	+
12	Parental Influence	.100	.003*	+	+
*Significant at p<.05					

6) Also, as the non-significant predictors were removed from model 1 to model 5 R square got changed .480 to .476 which is again very minute, i.e., .004
8) Adjusted R square also changed very minute from model 1 to model 5 (.004). The value shows model to be moderately strong goodness of fit
7) Table 53 given below gives of detail about the relationship of various predictors with ESCB among private school children.

Similarly, the first part of table 54 for government school children gives us the estimates of these b-values. These b-values (unstandardized) indicate the individual contribution of each independent variable to the model.

We can define the model as follows:

ESCB = .455 + .240 PAI +.174 EC + .141 SR + .133 PI+ .103 EV + .091 OE

EV = Environmental Value, EC= Environmental Concern, OE = Outcome Expectation, SR= Self-Regulation, PI= Peer Influence and PAI = Parental Influence

The b-values tells us about the relationship between ESCB and each independent variable on 2 counts:

a) **Direction:** whether the relationship between dependent and independent variable is positive or negative. Positive relationship indicates a rise in dependent variable when independent variable increases and negative relationship indicates a decrease in dependent variable with an increase in the independent variable.
b) **Score:** it represents the degree each predictor affects the outcome of the effects of all other predictors are held constant.

As the values are positive, we can tell that there is a positive relationship between the independent and dependent variable. Positive values resulted for all the six-independent variable, i.e., environmental value, environmental concern, outcome expectation, self-regulation, peer influence and parental influence are positively related to ESCB.

Thus, as environmental value increases, ESCB increases; as environmental concern, outcome expectation, self-regulation, peer influence, and parental influence increase ESCB increase.

The b-values also tell us to what degree each independent variable affects the dependent if the effect of all other independent variables is held constant. Here in the above model b-value indicates that if the environmental attitude is increased by one unit, then the additional change in ESCB score will be by .103. This interpretation is true only if the effects of other independent variables are held constant. Similarly, for other variables, a unit change in the particular independent variable keeping other variables constant will bring change in ESCB with respect to the b value.

T- test value in the above table determines whether the predictor is making a significant contribution to the model (which is parallel to what is exhibited by the value of significance: smaller the value of *Sig*[31] *{and the larger the value of t})*, the greater the contribution of that independent variable.

For the above given model, environmental value (t(246)=2.38, p<.05), environmental concern (t(246)=3.879, p<.05), outcome expectation (t(246)=2.022, p<.05), self-regulation (t(246)= 2.799, p<.05), peer influence (t(246)= 2.915, p<.05) and parental influence (t(246)=5.535, p<.05).

Table 54: Coefficients[a] of independent variable (government school children)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
7	(Constant)	.455	.169		2.689	.008	.122	.789		
	EV	.103	.043	.110	2.379	.018	.018	.189	.942	1.062
	EC	.174	.045	.193	3.879	.000	.086	.262	.810	1.235
	OE	.091	.045	.107	2.022	.044	.002	.180	.717	1.394
	SR	.141	.050	.164	2.799	.005	.042	.239	.585	1.709
	PI	.133	.046	.169	2.915	.004	.043	.224	.596	1.678
	PAI	.240	.043	.302	5.535	.000	.154	.325	.673	1.486

Where: EA= Environmental Attitude, ES = Environmental Sensitivity, EK= Environmental Knowledge, ER= Environmental Responsibility, EV= Environmental Value, EC = Environmental Concern, SE= Self-Efficacy, OE = Outcome Expectation, OEC= Outcome Expectancies, SR = Self-Regulation, PI = Peer-Influence, PAI = Parental Influence

a. Dependent Variable: ESCB

Standardized beta values tell us the number of standard deviation that the dependent variable will change as a result of one standard deviation change in the independent variable. The standardized beta values of environmental value (.385), environmental concern (.193), outcome expectancies (.107), self-regulation (.164), peer influence (.169) and parental influence (.302). To

[31] When significance value of B is .05, it actually means that odds of getting these sample results by chance if b were really zero would be less than 5 in 100 samples. This is a very rare event, and in such cases if direction of observed relationship between independent and dependent variables is same as expected, null hypothesis that b is zero is rejected and alternative i.e that absolute value of b is something greater than zero is accepted.

interpret these values, we need to know the standard deviations of all the variables in this model. These values can be seen from descriptive table 47. For environmental value, the standardized beta value is .110, which indicates that as value is increased by one standard deviation, ESCB scores increases by .110 standards deviation. The standard deviation of environmental value was .385, and so this constitutes a change of .0423 in the score of behaviour (.110 * .385).

From the table 54 last columns named "collinearity statistics" checks the assumption of multicollinearity. According to the researcher (Field,2009; Bowerman, 1990; Myers, 1990) if largest VIF is greater than 10 then there is a cause for concern. In our case, all the values of predictors are less than 10. Similarly, if tolerance value is below .2, it indicated a problem. Here it indicates all the value above .585 hence we can safely conclude that there is no multicollinearity.

From the magnitude of the t statics, we can see that parental influence has the highest impact followed by environmental concern, peer influence. Environmental attitude and outcome expectancies have less impact.

4.2.3.3. Findings for government school children:

1) All the seven models for government school children were significant, but all the predictors in each model were not significant. Hence only 7th model was considered for the study where six predictors were found significant.
2) Parental Influence, Environmental Concern, Self-regulation, Peer Influence, Environmental value, and Outcome expectation are found as the most significant predictors of ESCB among government primary school children
3) Environmental Attitude, Environmental Knowledge, Environmental Responsibility, Environmental Sensitivity, Self-Efficacy and Outcome expectancies are found as nonsignificant predictors of ESCB among private primary school children.
4) Among significant predictors Parental Influence, Peer Influence and Self-regulation were found to be highly correlated to ESCB.
5) As the non-significant predictors were removed from model 1 to model 7 multiple correlations got changed from .669 to .663 which is very non-significant, i.e., just .003
6) Also, as the non-significant predictors were removed from model 1 to model 7 R square got changed .448 to .440 which is again very minute, i.e., .008
9) Adjusted R square also changed very minute from model 1 to model 5 (.004). The value shows model to be moderately strong goodness of fit

7) Table 55 gives of detail about the relationship of various predictors with ESCB among government school children.

Table 55: Relationship of various IV with DV among government school children

S.No	Variable Name	Unstandardized B coefficients	Significance	Relationships	
				Exp.	Obs.
1	Environmental Attitude	.072	.158	+	+
2	Environmental Sensitivity	.063	.169	+	+
3	Environmental Knowledge	.013	.786	+	+
4	Environmental Responsibility	.037	.461	+	+
5	Environmental Concern	.174	.000*	+	+
6	Environmental Value	.103	.018*	+	+
7	Self-efficacy	.024	.654	+	+
8	Outcome Expectation	.091	.044*	+	+
9	Outcome Expectancies	.006	.922	+	+
10	Self-Regulation	.141	.005*	+	+
11	Peer Influence	.133	.004*	+	+
12	Parental Influence	.240	.000*	+	+
*significant at p< .05					

Overall, comparing table 43, 52 and 54 we can see that Environmental Value, Outcome Expectancies, Self-Regulation, Peer Influence and Parental Influence are found to be common significant predictors among private, government and both.

4.3. Identifying impact of social learning forms on ESCB

This section provides the results of investigations made into objective 3 which attempts to assess the impact of social learning (SL) forms on ESCB. Accordingly, three sub-sections have been given:

1) Results & findings for impact of social learning forms on ESCB in primary school children

2) Results & findings for the impact of 2 types of SL forms, namely, active learning (AL) and passive learning (PL) which correspond to the 2-hypothesis mentioned under objective 3.

3) Results & findings for the impact of AL and PL methods on ESCB in government and private primary school children (as an extension of objective 3).

Statistical tools used

"Analysis of Variance," also known as "ANOVA" a statistical tool used to analyze the differences between group means and their associated procedures (such as "variation" among and between groups), developed by statistician and evolutionary biologist Ronald Fisher. In the current work too, the basic approach at hand is to compare the impact of AL and PL forms on ESCB for different combinations of groups, depending on the task at hand.

For example, where results had to be derived for – 'or impact of social learning forms on ESCB in primary school children', the 6 groups which received 6 different types of interventions (3 active and 3 passive) from both types of schools were compared to control group (which also was randomly selected private and one randomly selected government school from the population). Precisely, to determine the impact of these learning forms, one has to determine the difference between the means of random samples.

While other tests are available to test the mean difference, like- Z-test and t- test could be used, ANOVA has been chosen for its wider application where multiple hypotheses can be tested at the same time leading to avoiding the risk of type 1 error. The same has been elaborated below in more detail.

Z-test and t-test are used to determine the mean difference when there are only two sample means whereas ANOVA is used to compare more than two sample means. Since, in this study three groups (control, active and passive groups) has been used for hypothesis testing, ANOVA is appropriate. ANOVA is preferred over t-test because if we carry out t-tests on every pair of groups, then we would have to carry out three separate tests: one to compare groups control and active, one to compare control and passive, and one to compare groups active and passive. If each of these t-tests uses a .05 level of significance than for each test the probability of falsely rejecting the null hypothesis (known as Type I error) is only 5%. Therefore, the probability of not making type 1 error is .95 (95%) for each test.

If we assume that each test is independent, then the overall probability of no Type I error is $(.95)^3 = .95 * .95 * .95 = .857$, because probability of no type I errors is $(p)^x$

Where: p = probability of making error = 0.95, x is no of tests = 3

Thus, the probability of making no Type I error is .857. Consequently, we can calculate the probability of making at least one Type I error by subtracting this number from 1 (as the maximum probability of any event occurring is 1). So, the probability of at least one Type I error is 1-.857 =

.143, or 14.3%, Therefore across this group of tests, the probability of making a Type I error has increased from 5% to 14.3%, a value greater than the criterion accepted by social scientists. For this reason, we used ANOVA rather than conducting lots of t- tests (Field, 2009; Koul, 2009)

ANOVA as a statistical tool is also used by researchers (Hackathorn et al, 2011) for determining the effectiveness of social learning forms. Therefore, because of the above reason in this research ANOVA is used as a statistical tool.

4.3.1. Assumptions on Analysis of Variance (ANOVA)

1) The population distribution should be normal. A standard normal distribution is a normal distribution with mean 0 and standard deviation 1. But from the 68-95-99.7 rule we know that for a variable with the standard normal distribution, 68% of the observations fall between -1 and 1 (within 1 standard deviation of the mean of 0), 95% fall between -2 and 2 (within 2 standard deviations of the mean) and 99.7% fall between -3 and 3 (within 3 standard deviations of the mean). This assumption was checked for N= 1306 and details are provided in the given figure 16. The graph in Figure 16 represents the normal distribution curve of ESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

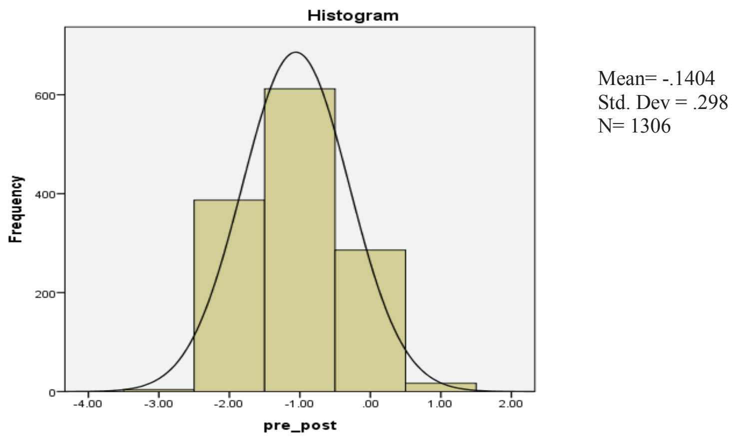


Figure 16: Normal distribution curve of ESCB for primary school children

Although researcher suggests that F is insensitive to variations in the shape of population distribution (Koul, 2009).

2) The 2nd assumption is that samples have to come from a randomized or randomly sampled design. It has been fulfilled in this study as the subjects were randomly assigned to three experimental groups (schools randomly selected from each group, details in the chapter on "Method").
3) The assumption of homogeneity of variance: This is tested by applying Levene's test to the data of the three group. From the table 56 given below, we can see that Levene's value is insignificant, i.e., the value of *Sig* is greater than .05 ($p > .05$). Thus, the variances across the three groups are significantly similar (Field, 2009). Thus, the 3rd assumption is met.

Table 56: Test of Homogeneity of Variances of ESCB score among primary school children

Difference (Pre-Post)

Levene Statistic	df1	df2	Sig.
32.951	2	1303	.060

4.3.2. Results for impact of SL forms on ESCB among primary school children

As mentioned in the background note for the chapter, in the beginning, the 1st round of analysis was carried out for checking how SL forms impact ESCB for Control vs. intervention groups. Intervention groups included both passive and active intervention groups among primary school children. Running one-way ANOVA (where one factors' impact is assessed) to obtain SL form's impact on ESCB gave results given in table 57. The main focus was on the changes in the dependent variables (ESCB) from pre-intervention phase (or immediately before the intervention) to the postintervention stage (immediately after the intervention). One-way ANOVA was performed using SPSS 16.

Table 57 is divided into between group-effects (effects due to the model-the experiment effect) and within -group effects (this is the unsystematic variation in the data). In the between group row, the value of the sum of squares for the model is 6.337; while the row labeled within-group gives detail of the unsystematic variation within the data and gives the value of the sum of squares is 110.031.

The sum of squares and the Mean squares represent the experimental effect. The mean square for the model (value of the sum of squares for "between group" divided by the corresponding degree of freedom, i.e., 2) comes to be = 3.168. The amount of unsystematic variation (value of the sum of squares for "within group" divided by the corresponding degree of freedom, i.e., 1303) works out to be = 0.084.

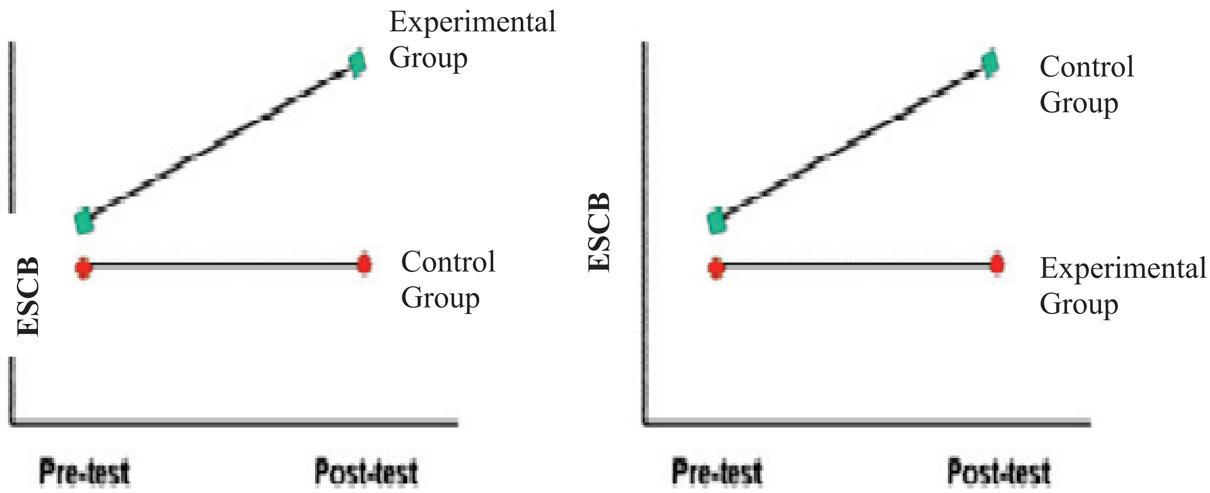
To test whether the group means are the same, one checks the F-ratio for the combined between-group effect. The value of this ratio is 37.519 whereas critical value is 3.00 at df (2, 1303). Therefore, as calculated value is greater than the critical value, we can conclude that there is a significant difference between the groups. The final column labeled *Sig* indicates the likelihood of an F-ratio the size of the one obtained occurring if there was no effect in the population. Because the observed significance value of F is less than .05, we can, therefore, conclude that there was a significant difference between the three groups in their ESCB when intervention was given in the form of active and passive.

Table 57: ANOVA statistic showing difference between groups of primary school's children ESCB Score

Pre_post

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6.337	2	3.168	37.519	.000
Within Groups	110.031	1303	.084		
Total	116.368	1305			

Thus, it can be concluded from results that there is a significant difference in the ESCB scores for control vs. intervention groups. From this result, it is not possible to infer for which group – control or exposed to the intervention, had a higher pre-post difference on ESCB score. What we only know is that there is a significant difference in the pre-post difference for 2 groups. To exemplify this, the ANOVA results show that at the pre-test the difference between the groups was small or none and at the post-test stage this difference is large. So, the difference between the differences is consistent and significant. But even if the 2 lines were exchanged in a tab, that is, the control group was experimental and vice-versa, ANOVA would have given same results.



The next section looked at data from another perspective, mixed ANOVA (check this) was conducted for the three levels of the independent variable (i.e., the control group, active learning, and passive learning) to see how each group fared in pre vs. post test results. Table 58 provides the descriptive statistics for the three levels of the independent variable stated above.

Results from table 58 indicate the mean of the difference between pre-& post-test scores of ESCB for each group. Control group results show (N=195 participants both types of school) that mean difference is (-0.0431), and the standard deviation is (0.215) while, for active learning group (N= 565 participants from both types of school) mean difference is (-0.2177), and the standard deviation is (0.294). Similarly, for passive learning group (N= 546 participants both types of school), mean difference is (-0.095) and standard deviation (0.309). Thus, it can be seen that the posttest scores for ESCB for each of the three groups has gone up and maximum uplift in ESCB score is for active intervention facing the group.

Table 58: Descriptive ESCB scores of different groups of primary school children

Pre-Post				
	N	Mean	Std. Deviation	Std. Error
Control	195	-0.0431	.21592	.01546
Active	565	-0.2177	.29423	.01238
Passive	546	-0.0952	.30936	.01324
Total	1306	-0.1404	.29861	.00826

As the above analysis does not tells how groups differed from each other, by how much and if the difference is significant, one should perform post hoc tests[32] where we can have a pairwise comparison between the groups. Table 59 performs the pairwise comparison of participants' difference between pre-and post-scores of ESCB.

Table 59: Multiple comparisons of difference between pre-and post ESCB scores of primary school children

Dependent Variable: ESCB(PRE-POST) Tukey HSD						
(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Active	0.17462*	.02414	.000	.1180	.2313
Control	Passive	.05216	.02424	.080	-.0047	.1090
Active	Passive	0.12246*	.01744	.000	-.1634	.0815
* The mean difference is significant at the 0.05 level.						

Results from table 59 reveal that mean the difference between 2 scores: 1) the difference between pre-vs. post ESCB scores for control group for all respondents and 2) the difference between pre vs. post ESCB scores for active intervention exposed group participants is 0.174, for which significance or p = 0.000 (also shown in figure 1). Thus, we conclude that there is a significant difference between the 2 groups – control and AL group, for ESCB score from pretest to posttest. Thus, it can also be concluded that the improvement in active group scores (from pretest to posttest) was more than the improvement in control group scores (from pretest to post-test) by 0.174 and that this difference is also a significant one.

Similarly, it can also be concluded that the improvement in passive group scores (from pretest to post-test) was more than the improvement in control group scores (from pretest to post-test) by 0.052. However, this difference is not significant at p = .05 level.

On the same lines, it can also be concluded that the improvement in active group scores (from pretest to post-test) was more than the improvement in passive group scores (from pretest to post-test) by 0.122 and that this difference too is a significant one.

[32] Post hoc test is a set of comparisons between group means that were not thought of before data were collected. Typically, these tests involve comparing the means of all combinations of pairs of groups. To compensate for the number of tests conducted, each test uses a strict criterion for significance.

ESCB mean score difference between pre-and-post test score of active learning and passive learning and control group can be easily seen in Figure 17.

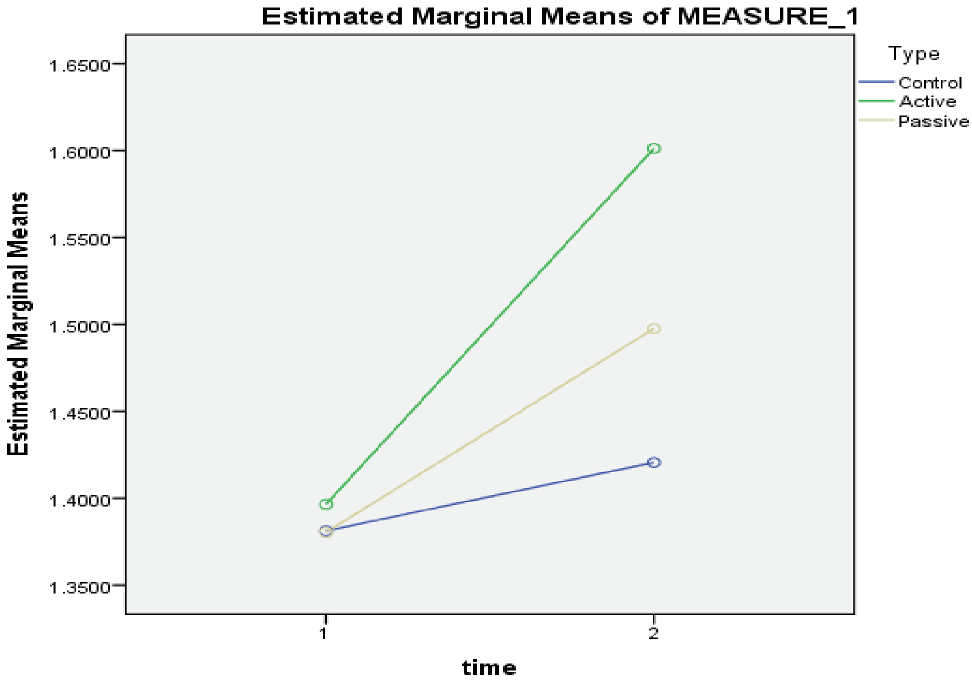


Figure 17: Mean number of ESCB per study part: means for the intervention group and control group across time

In conclusion, there was a general increase in the ESCB scores across time (pretest to posttest) for all 3 groups. The change from before to after the intervention was significant for the active learning group. This result hypothesis 13a.

Additionally, it can be seen that while there is a difference in means from before to after the intervention for passive vs. control group too, the result is not significant. The result, therefore, does not support hypothesis 14a. From table 59, it can also be seen that the difference in ESCB scores is positive and significant for AL exposed group vs. PL exposed group showing that AL group performed better in post test scores. Planned contrast revealed that there is an overall as expected effect of active and passive learning methods on scores of ESCB (although not significant for one instance).

4.3.2.1. Calculating the effect size

Effect size is a value which allows one to see how much of the independent variable (IV, here intervention) has affected the dependent variable (DV, here ESCB) in an experimental study. In other words, it looks at how much variance in your DV was a result of the IV. For generating effect size between control and intervention group 2 outputs will be needed:

a) Active vs. control group which will calculate effect size for how much of variance in ESCB scores seen in AL group is caused by intervention
b) Passive vs. control which will calculate effect size for how much of variance in ESCB scores seen in PL group is caused by intervention

Even though our t-statistic is statistically significant, this doesn't mean our effect is important in practical terms. To discover whether our effect is substantive we should calculate the effect size by converting t-value into Cohen's d-value by using the following equation where the sample size is different (Rosenthal,1991)[33],[34]:

$$d = \frac{t(n_1 + n_2)}{\sqrt{(n_1 + n_2 - 2)(n_1 n_2)}}$$

1) **Effect size between Control vs. Intervention (Active and Passive)**

$$d = -16.995\ (195+1111) / \sqrt{(195 + 1111 - 2)\ (195*1111)}$$

$$d = -1.32053895$$

Therefore, if we see the benchmark for effect sizes, this represents large effect. Therefore, as well as being statistically significant, this effect is moderate.

2) **Effect size between control and active**

$$d = -\ 16.938\ (195+565) / \sqrt{(195 + 565 - 2)\ (195*565)}$$

$$d = -\ 1.40863861$$

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

[33] https://www.polyu.edu.hk/mm/effectsizefaqs/calculator/calculator.html
[34] https://www.polyu.edu.hk/mm/effectsizefaqs/effect_size_equations2.html

3) **Effect size between control and passive**

$$d = -7.881\,(195+546) / \sqrt{(195 + 546 - 2)\,(195*546)}$$

$$d = -0.65251275$$

Therefore, if we see the benchmark for effect sizes this represent a moderate effect. But there is non-significant, effect.

4.3.2.2. Findings

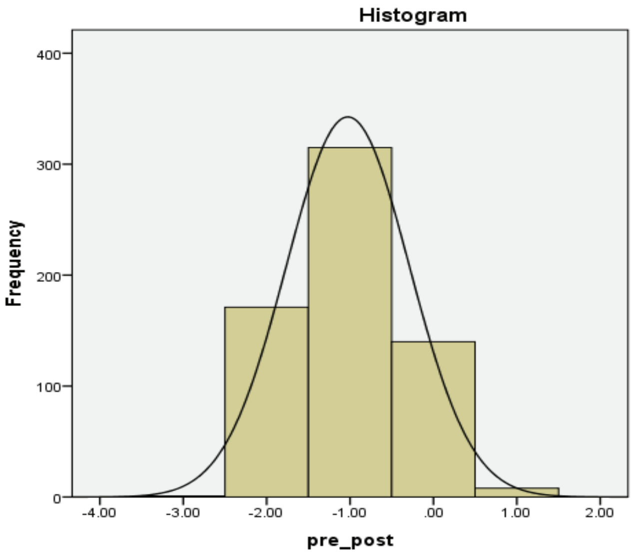
1) There was the significant and positive effect of the intervention on ESCB scores for two groups which were exposed to interventions as compared with control group.
2) There was the significant and positive effect of the intervention on ESCB scores for AL interventions exposed group as compared with control group.
3) There was non-significant and yet positive effect of the intervention on ESCB scores for PL interventions exposed group as compared with control group.
4) Planned contrast revealed that teaching ESCB with active learning methods significantly increase ESCB score as compared to teaching with passive learning methods d = -2.011. In simple terms, the impact of active methods was found to be more effective than a passive method on ESCB scores.

4.3.3. Results for impact of SL forms on ESCB for private school children

Assumptions on Analysis of Variance (ANOVA)

1) Assumption related to population normal distribution was checked for N= 641 and details are provided in the given figure 18. Graph as figure 18 represents the normal distribution curve of ESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

2) The 2nd assumption is that samples have to come from a randomized or randomly sampled design. It has been fulfilled in this study as the subjects were randomly assigned to three experimental groups (schools randomly selected from each group, details in the chapter on "Method").



Mean= -.1847
Std. Dev = .290
N= 641

Figure 18: Normal distribution score of ESCB for private school children

3) The assumption of homogeneity of variance: This is tested by applying Levene's test to the data of the three group. From the table 60, we can see that Levene's value is insignificant, i.e., the value of *Sig* is greater than .05 ($p > .05$). Thus, the variances across the three groups are significantly similar (Field, 2009). Thus, the 3rd assumption is met.

Table 60: Test of Homogeneity of Variances among the groups of private school children ESCB Score

Pre_post

Levene Statistic	df1	df2	Sig.
15.697	2	638	.073

Results for impact of SL forms on ESCB

As mentioned in the background note for the chapter, in the beginning, the 2nd round of analysis was carried out for checking how SL forms impact ESCB for Control vs. intervention groups among private primary school children. Running one-way ANOVA (where one factors' impact is assessed) to obtain SL form's impact on ESCB gave results given in table 61. The main focus was on the changes in the dependent variables (ESCB) from pre-intervention phase (or immediately before the intervention) to the post-intervention stage (immediately after the intervention). One-way ANOVA was performed using SPSS 16.

Table 61 is divided into between group-effects (effects due to the model-the experiment effect) and within -group effects (this is the unsystematic variation in the data). In the between group row, the value of sum of squares for the model is 1.779; while the row labeled within-group gives detail of the unsystematic variation within the data and gives value of sum of squares as 52.362

The sum of squares and the Mean squares represent the experimental effect. The mean square for the model (value of the sum of squares for "between group" divided by the corresponding degree of freedom, i.e., 2) comes to be = .889. The amount of unsystematic variation (value of the sum of squares for "within group" divided by the corresponding degree of freedom, i.e. (638) works out to be = 0.082.

To test whether the group means are the same, one checks the F-ratio for the combined between-group effect. The value of this ratio is 10.837 whereas critical value is 3.00 at df (2, 638). Therefore, as calculated value is greater than the critical value, we can conclude that there is a significant difference between the groups. The final column labeled *Sig* indicates the likelihood of an F-ratio the size of the one obtained occurring if there was no effect in the population. Because the observed significance value of F is less than .05, we can, therefore, conclude that there was a significant difference between the three groups in their ESCB when intervention was given in the form of active and passive.

Table 61: ANOVA statistic showing difference between groups of private school children ESCB Score

Pre_post

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.779	2	.889	10.837	.000
Within Groups	52.362	638	.082		
Total	54.141	640			

Thus, it can be concluded from results that there is a significant difference in the ESCB scores for control vs. intervention groups. From this result, it is not possible to infer for which group – control or exposed to the intervention, had a higher pre-post difference on ESCB score.

The next section looked at data from another perspective, mixed ANOVA (check this) was conducted for the three levels of the independent variable (i.e., control group, active learning, and passive learning) to see how each group fared in pre vs. post test results. Table 62 provides the descriptive statistics for the three levels of the independent variable stated above.

Table 62: Descriptive ESCB scores of different groups of private school children

PRE-POST				
	N	Mean	Std. Deviation	Std. Error
Control	97	-0.0866	0.20444	0.02076
Active	269	-0.2379	0.31701	0.01933
Passive	275	-0.1673	0.27958	0.01686
Total	641	-0.1847	0.29085	0.01149

Results from table 62 indicate the mean of the difference between pre & post-test scores of ESCB for each group. Control group results show (N=97 participants for private school children) that mean difference is (-0.0866), and the standard deviation is (0.2044) while, for active learning group (N= 269 participants for private school) mean difference is (-0.2379), and the standard deviation is (0.314). Similarly, for passive learning group (N= 275 participants for private school), mean difference is (-0.167) and standard deviation (0.279). Thus, it can be seen that the posttest scores for ESCB for each of the three groups has gone up and maximum uplift in ESCB score is for active intervention facing the group.

As the above analysis does not tells how groups differed from each other, by how much and if the difference is significant, one should perform post hoc tests where we can have a pairwise comparison between the groups. Table 63 performs the pairwise comparison of participants' difference between pre-and post-scores of ESCB

Table 63: Multiple Comparisons of difference between pre-and post ESCB scores of private school children

Dependent Variable: Pre_post						
(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Active	0.15132*	0.03393	.000	.0716	.2310
Control	Passive	0.08067*	0.03383	.046	.0012	.1602
Active	Passive	-0.07065*	0.02457	.012	-.1284	-.0129
*. The mean difference is significant at the 0.05 level.						

Results from table 63 reveal that mean difference between 2 scores: 1) the difference between pre-vs. post ESCB scores for control group for all respondents and 2) the difference between pre vs. post ESCB scores for active intervention exposed group participants is 0.151, for which significance or p = 0.000 (also shown in figure 2). Thus, we conclude that there is a significant difference between the 2 groups – control and AL group, for ESCB score from pretest to posttest. Thus, it can also be concluded that the improvement in active group scores (from pre-test to post-test) was more than the improvement in control group scores (from pretest to posttest) by 0.151 and that this difference is also a significant one.

Similarly, it can also be concluded that the improvement in passive group scores (from pretest to posttest) was more than the improvement in control group scores (from pretest to posttest) by 0.080. However, this difference is also significant at p = .05 level.

On the same lines, it can also be concluded that the improvement in active group scores (from pretest to posttest) was more than the improvement in passive group scores (from pretest to posttest) by 0.070 and that this difference too is a significant one.

ESCB mean score difference between pre-and-post test score of active learning and passive learning and control group can be easily seen in figure 19.

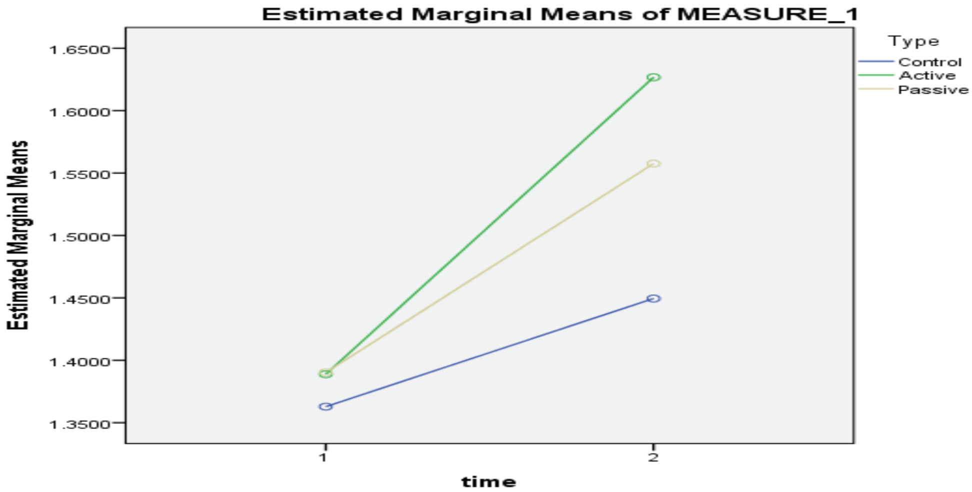


Figure 19: **Mean number of ESCB (among private school children) per study part: means for the intervention group and control group across time**

In conclusion, there was a general increase in the ESCB scores across time (pre-test to post-test) for all three groups. The change from before to after the intervention was significant for the active learning group.

From table 63, it can also be seen that the difference in ESCB scores is positive and significant for AL exposed group vs. PL exposed group showing that AL group performed better in post test scores. Planned contrast revealed that there is an overall as expected effect of active and passive learning methods on scores of ESCB.

4.3.3.1. ***Calculating the effect size:***

Effect size is a value which allows one to see how much of the independent variable (IV, here intervention) has affected the dependent variable (DV, here ESCB) in an experimental study. In other words, it looks at how much variance in your DV was a result of the IV. For generating effect size between control and intervention group 2 outputs will be needed:

a) Active vs. control group which will calculate effect size for how much of variance in ESCB scores seen in AL group is caused by intervention
b) Passive vs. control which will calculate effect size for how much of variance in ESCB scores seen in PL group is caused by intervention

Even though our t-statistic is statistically significant, this doesn't mean our effect is important in practical terms. To discover whether our effect is substantive we should calculate the effect size by converting t-value into Cohen's d-value by using the following equation where the sample size is different (Rosenthal,1991):

$$d = \frac{t(n_1 + n_2)}{\sqrt{(n_1 + n_2 - 2)(n_1 n_2)}}$$

1) Effect size between Control vs. Intervention (Active and Passive)

$d = -16.079\ (97+544) / \sqrt{(97 + 544 - 2)\ (97*544)}$

$d = -1.77493036$

Therefore, if we see the benchmark for effect sizes, this represents large effect. Therefore, as well as being statistically significant, this effect is large

4) Effect size between control and active

$d = -12.667\ (97+269) / \sqrt{(97 + 269 - 2)\ (97*269)}$

$d = -1.50432668$

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

5) Effect size between control and passive

$d = -7.881\ (97+275) / \sqrt{(97 + 275 - 2)\ (97*275)}$

$d = -1.264$

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

4.3.3.2. Findings

1) There was the significant and positive effect of the intervention on ESCB scores for two groups which were exposed to interventions as compared with control group.
2) There was the significant and positive effect of the intervention on ESCB scores for AL and PL interventions exposed group as compared with control group.
3) Planned contrast revealed that teaching ESCB with active learning significantly increased ESCB score as compared to passive learning methods Cohen's d = -1.56 In simple terms, the impact of active methods was found to be more effective than a passive method on ESCB scores.

4.3.4. Results for impact of SL forms on ESCB for government school children

Assumptions on Analysis of Variance (ANOVA)

1) Assumption related to population normal distribution was checked for N= 641 and details are provided in Figure 20. Graph in figure 20 represents the normal distribution curve of ESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

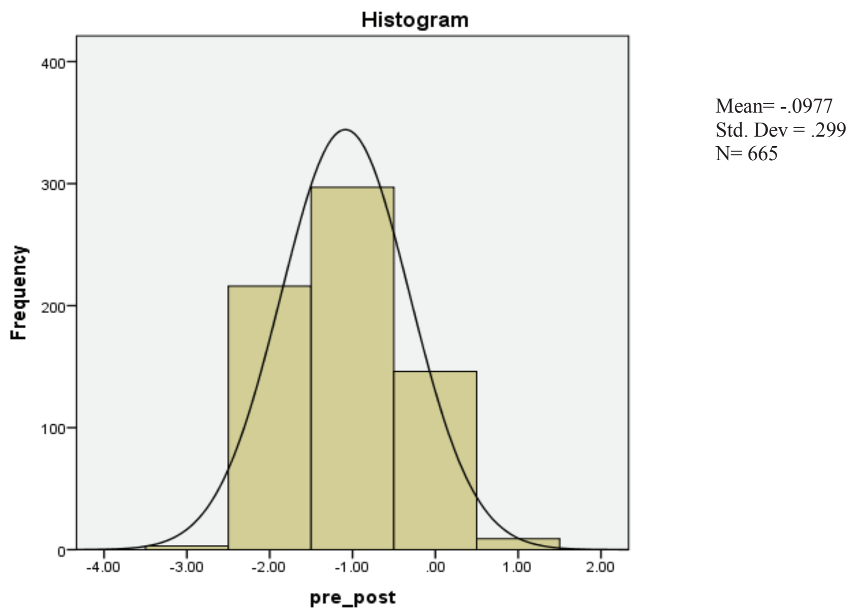


Figure 20: Normal Distribution score of ESCB for government school children

2) The 2nd assumption is that samples have to come from a randomized or randomly sampled design. It has been fulfilled in this study as the subjects were randomly assigned to three experimental groups (schools randomly selected from each group, details in the chapter on "Method").
3) The assumption of homogeneity of variance: This is tested by applying Levene's test to the data of the four group. From the table 64, we can see that Levene's value is insignificant, i.e., the value of *Sig* is greater than .05 ($p > .05$). Thus, the variances across the three groups are significantly similar (Field, 2009). Thus, the 3rd assumption is met.

Table 64: Test of Homogeneity of Variances among the groups of government school children ESCB Scores

Pre_post			
Levene Statistic	df1	df2	Sig.
13.756	2	662	.066

Results for impact of SL forms on ESCB

As mentioned in the background note for the chapter, in the beginning, the 3rd round of analysis was carried out for checking how SL forms impact ESCB for Control vs. intervention groups among government primary school children. Running one-way ANOVA (where one factors' impact is assessed) to obtain SL form's impact on ESCB gave results given in table 65. The main focus was on the changes in the dependent variables (ESCB) from pre-intervention phase (or immediately before the intervention) to the post-intervention stage (immediately after the intervention). One-way ANOVA was performed using SPSS 16.

Table 65 is divided into between group-effects (effects due to the model-the experiment effect) and within -group effects (this is the unsystematic variation in the data). In the between group row, the value of sum of squares for the model is 5.540; while the row labeled within-group gives detail of the unsystematic variation within the data and gives value of sum of squares as 54.218

The sum of squares and the Mean squares represent the experimental effect. The mean square for the model (value of the sum of squares for "between group" divided by the corresponding degree of freedom, i.e. (2) comes to be = 2.77. The amount of unsystematic variation (value of the sum of squares for "within group" divided by the corresponding degree of freedom, i.e. (662) works out to be = 0.082.

To test whether the group means are the same, one checks the F-ratio for the combined between-group effect. The value of this ratio is 33.819 whereas critical value is 3.00 at df (2, 662). Therefore, as calculated value is greater than the critical value, we can conclude that there is a significant difference between the groups. The final column labeled *Sig* indicates the likelihood of an F-ratio the size of the one obtained occurring if there was no effect in the population. Because the observed significance value of F is less than .05, we can, therefore, conclude that there was a significant difference between the three groups in their ESCB when intervention was given in the form of active and passive.

Table 65: ANOVA statistic showing difference between groups of government school children ESCB Score

Pre_post					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.540	2	2.770	33.819	.000
Within Groups	54.218	662	.082		
Total	59.758	664			

Thus, it can be concluded from results that there is a significant difference in the ESCB scores for control vs. intervention groups. From this result, it is not possible to infer for which group – control or exposed to the intervention, had a higher pre-post difference on ESCB score. The next section looked at data from another perspective, mixed ANOVA (check this) was conducted for the three levels of the independent variable (i.e., control group, active learning, and passive learning) to see how each group fared in pre vs. post test results. Table 66 provides the descriptive statistics for the three levels of the independent variable stated above.

Table 66: Descriptive ESCB scores of different groups of government school children

PRE_POST				
	N	Mean	Std. Deviation	Std. Error
Control	98	0.0000	0.21934	0.02216
Active	296	-0.1993	0.27112	0.01576
Passive	271	-0.0221	0.32127	0.01952
Total	665	-0.0977	0.29999	0.01163

Results from table 66 indicate the mean of the difference between pre-&-post-test scores of ESCB for each group. Control group results show (N=98 participants for private school children) that mean difference is (0.000), and the standard deviation is (0.219) while, for active learning group (N= 296 participants for private school) mean difference is (-0.1993), and the standard deviation is (0.271). Similarly, for passive learning group (N= 271 participants for private school), mean difference is (-0.221) and standard deviation (0.321). Thus, it can be seen that the posttest scores for ESCB for each of the three groups has gone up and maximum uplift in ESCB score is for active intervention facing the group.

As the above analysis does not tells how groups differed from each other, by how much and if the difference is significant, one should perform post hoc tests where we can have a pairwise comparison between the groups. Table 67 performs the pairwise comparison of participants' difference between pre-and post-scores of ESCB

Table 67: Multiple Comparisons of difference between pre-and post ESCB scores of government school children

Dependent Variable: Pre_post Tukey HSD						
(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Active	0.19932*	0.03335	0.000	.1210	.2777
Control	Passive	0.02214	0.03373	0.789	.0571	.1014
Active	Passive	-0.17718*	0.02406	0.000	-.2337	.1207
*. The mean difference is significant at the 0.05 level.						

Results from table 67 reveal that mean the difference between 2 scores: 1) the difference between pre-vs. post ESCB scores for control group for all respondents and 2) the difference between pre vs. post ESCB scores for active intervention exposed group participants is 0.199, for which significance or p = 0.000. Thus, we conclude that there is a significant difference between the 2 groups – control and AL group, for ESCB score from pretest to posttest. Thus, it can also be concluded that the improvement in active group scores (from pre-test to post-test) was more than the improvement in control group scores (from pretest to posttest) by 0.199 and that this difference is also a significant one.

Similarly, it can also be concluded that the improvement in passive group scores (from pretest to posttest) was more than the improvement in control group scores (from pretest to posttest) by 0.022. However, this difference is not significant at p = .05 level.

On the same lines, it can also be concluded that the improvement in active group scores (from pretest to posttest) was more than the improvement in passive group scores (from pretest to posttest) by -0.177 and that this difference too is a significant one.

ESCB mean score difference between pre-and-post test score of active learning and passive learning and control group can be easily seen in Figure 21.

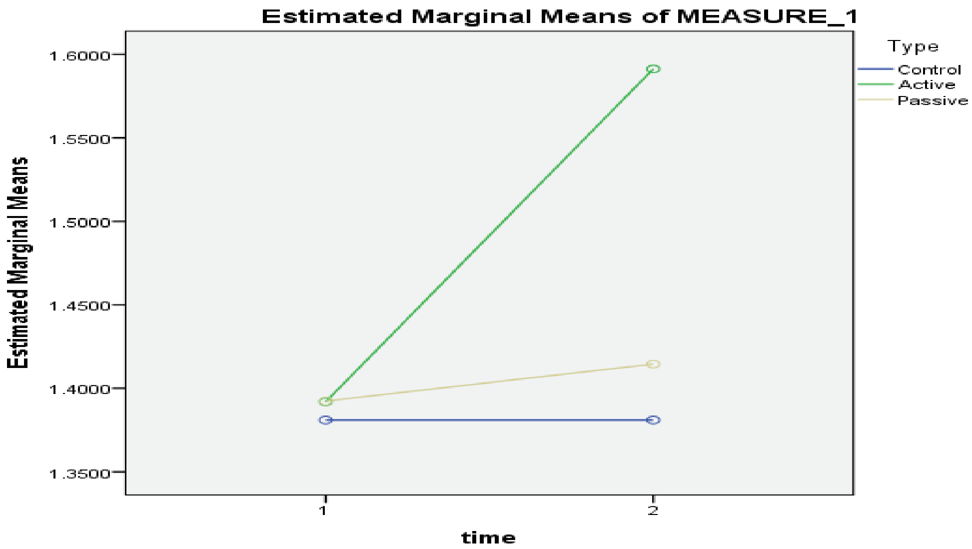


Figure 21: Mean number of ESCB (among government school children) per study part: means for the intervention group and control group across time.

In conclusion, there was a general increase in the ESCB scores across time (pre-test to post-test) for all 3 groups. The change from before to after the intervention was significant for the active learning group. Additionally, it can be seen that while there is a difference in means from before to after the intervention for passive vs. control group too, the result is not significant. From table 67, it can also be seen that the difference in ESCB scores is positive and significant for AL exposed group vs. PL exposed group showing that AL group performed better in post test scores. Planned contrast revealed that there is an overall as expected effect of active and passive learning methods on scores of ESCB (although not significant for one instance).

4.3.4.1. Calculating Effect Size

Effect size is a value which allows one to see how much of the independent variable (IV, here intervention) has affected the dependent variable (DV, here ESCB) in an experimental study. In other words, it looks at how much variance in your DV was a result of the IV. For generating effect size between control and intervention group 2 outputs will be needed:

a) Active vs. control group which will calculate effect size for how much of variance in ESCB scores seen in AL group is caused by intervention

b) Passive vs. control which will calculate effect size for how much of variance in ESCB scores seen in PL group is caused by intervention

Even though our t-statistic is statistically significant, this doesn't mean our effect is important in practical terms. To discover whether our effect is substantive we should calculate the effect size by converting t-value into Cohen's d-value by using the following equation where the sample size is different (Rosenthal,1991):

$$d = \frac{t(n_1 + n_2)}{\sqrt{(n_1 + n_2 - 2)(n_1 n_2)}}$$

1) Effect size between Control vs. Intervention (Active and Passive)

$$d = -8.402\ (97+567) / \sqrt{(97 + 567 - 2)\ (97*567)}$$

d= - 0.92457972

Therefore, if we see the benchmark for effect sizes, this represents large effect. Therefore, as well as being statistically significant, this effect is large

2) Effect size between control and active

$$d = -\ 10.890\ (98+296) / \sqrt{(98 + 296 - 2)\ (98*296)}$$

d = - 1.27239565

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

3) Effect size between control and passive

$$d = -\ 1.175\ (98+271) / \sqrt{(98 + 271 - 2)\ (97*271)}$$

d = - 0.13887802

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

4.3.4.2. Findings

1) There was significant and positive effect of the intervention on ESCB scores for two groups which were exposed to interventions as compared with control group.
2) There was significant and positive effect of the intervention on ESCB scores for AL interventions exposed group as compared with control group.
3) There was non-significant and yet positive effect of the intervention on ESCB scores for PL interventions exposed group as compared with control group.
4) Planned contrast revealed that teaching ESCB with active learning methods significantly increase ESCB score as compared to teaching with passive learning methods Cohen's d = -1.2. In simple terms, the impact of active methods was found to be more effective than a passive method on ESCB scores.
5) It was found that the effect sizes need to be investigated for findings.

Overall findings:

From section 4.3.2, 4.3.3 and 4.4.4 we can identify following four main findings:

1) Active methods were found effective and significant as compared to control groups among all the primary school children, including private and government school children.
2) The effect size of active learning methods with respect to passive group was more in all the schools
3) Passive methods were not found effective and significant as compared to control groups among all the primary school children. Only among private school children, it was found to be effective.
4) There was the maximum, and significant difference in ESCB scores was seen in active-government school children.

4.4. Identifying impact of social learning forms on attitude towards ESCB

This section provides the results of investigations made into objective 4 which attempts to assess the impact of social learning (SL) forms on attitude towards ESCB (AESCB). Accordingly, three sub-sections have been given:

1) Results & findings for impact of social learning forms on attitude towards ESCB in primary school children

2) Results & findings for the impact of 2 types of SL forms, namely, active learning (AL) and passive learning (PL) which correspond to the 2-hypothesis mentioned under objective 4.

3) Results & findings for the impact of AL and PL methods on AESCB in government and private primary school children (as an extension of objective 4).

Statistical tools used

"Analysis of Variance"[35] a statistical tool is also known as "ANOVA" is used to determine the impact of social learning forms on attitude towards ESCB among primary school children. To determine the impact of these learning forms we have to determine the difference between the means of random samples. ANOVA as a statistical tool is also used by various researchers for determining the effectiveness of social learning forms. Therefore, because of the above reason in this research ANOVA is used as a statistical tool.

4.4.1. Assumptions on Analysis of Variance (ANOVA)

1) The population distribution should be normal. A standard normal distribution is a normal distribution with mean 0 and standard deviation 1. But from the 68-95-99.7 rule we know that for a variable with the standard normal distribution, 68% of the observations fall between -1 and 1 (within 1 standard deviation of the mean of 0), 95% fall between -2 and 2 (within 2 standard deviations of the mean) and 99.7% fall between -3 and 3 (within 3 standard deviations of the mean). This assumption was checked for N= 1306 and details are provided in the given figure 22. Graph given below represents the normal distribution

[35] Reason for using ANOVA over multiple t-test has been discussed in section 4.3

curve of AESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

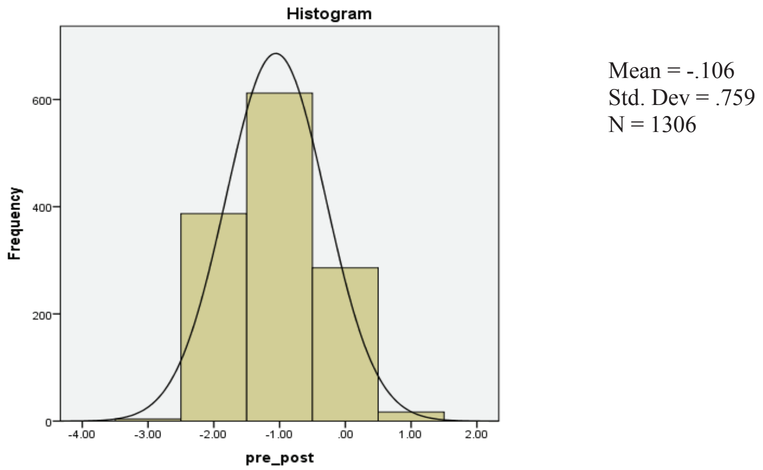


Figure 22: Normal distribution score of AESCB for primary school children

Although researcher suggests that F is insensitive to variations in the shape of population distribution (Koul, 2009).

4) The 2nd assumption is that samples have to come from a randomized or randomly sampled design. It has been fulfilled in this study as the subjects were randomly assigned to three experimental groups (schools randomly selected from each group, details in the chapter on "Method").
5) The assumption of homogeneity of variance: This is tested by applying Levene's test to the data of the three group. From the table 68, we can see that Levene's value is insignificant, i.e., the value of *Sig* is greater than .05 ($p > .05$). Thus, the variances across the three groups are significantly similar (Field, 2009). Thus, the 3rd assumption is met.

Table 68: Test of Homogeneity of Variances among the groups of Primary school children AESCB Scores

PRE_POST

Levene Statistic	df1	df2	Sig.
13.600	2	1303	.059

4.4.2. Results for impact of SL forms on AESCB among primary school children

As mentioned in the background note for the chapter, in the beginning, the 1st round of analysis was carried out for checking how SL forms impact AESCB for Control vs. intervention groups. Intervention groups included both passive and active intervention groups among primary school children. Running one-way ANOVA (where one factors' impact is assessed) to obtain SL form's impact on AESCB gave results given in table 69. The main focus was on the changes in the dependent variables (AESCB) from pre-intervention phase (or immediately before the intervention) to the post-intervention stage (immediately after the intervention). One-way ANOVA was performed using SPSS 16.

Table 69 is divided into between group-effects (effects due to the model-the experiment effect) and within -group effects (this is the unsystematic variation in the data). In the between group row, the value of the sum of squares for the model is 310.952; while the row labeled within-group gives detail of the unsystematic variation within the data and gives the value of the sum of squares is 441.741.

The sum of squares and the Mean squares represent the experimental effect. The mean square for the model (value of the sum of squares for "between group" divided by the corresponding degree of freedom, i.e., 2) comes to be = 155.476. The amount of unsystematic variation (value of the sum of squares for "within group" divided by the corresponding degree of freedom, i.e., 1303) works out to be = 0.339.

To test whether the group means are the same, one checks the F-ratio for the combined between-group effect. The value of this ratio is 458.606 whereas critical value is 3.00 at df (2, 1303). Therefore, as calculated value is greater than the critical value, we can conclude that there is a significant difference between the groups. The final column labeled *Sig* indicates the likelihood of an F-ratio the size of the one obtained occurring if there was no effect in the population. Because the observed significance value of F is less than .05, we can, therefore, conclude that there was a significant difference between the three groups in their AESCB when intervention was given in the form of active and passive.

Table 69: ANOVA statistic showing difference between groups of primary school children AESCB Scores

PRE_POST

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	310.952	2	155.476	458.606	.000
Within Groups	441.741	1303	.339		
Total	752.693	1305			

Thus, it can be concluded from results that there is a significant difference in the AESCB scores for control vs. intervention groups. From this result, it is not possible to infer for which group – control or exposed to the intervention, had a higher pre-post difference on AESCB score. What we only know is that there is a significant difference in the pre-post difference for two groups. To exemplify this, the ANOVA results show that at the pre-test the difference between the groups was small or none and at the post-test stage this difference is large. So, the difference between the differences is consistent and significant. But even if the 2 lines were exchanged in a tab, that is, the control group was experimental and vice-versa, ANOVA would have given same results.

The next section looked at data from another perspective, mixed ANOVA (check this) was conducted for the three levels of the independent variable (i.e., control group, active learning, and passive learning) to see how each group fared in pre-vs. post test results. Table 70 provides the descriptive statistics for the three levels of the independent variable stated above.

Table 70: Descriptive AESCB scores of different groups of primary school children

PRE_POST				
	N	Mean	Std. Deviation	Std. Error
Control	195	-0.3316	.58810	.04201
Active	565	-1.5877	.61056	.02557
Passive	546	-0.7611	.54854	.02361
Total	1306	-1.0574	.75946	.02102

Results from table 70 indicate the mean of the difference between pre & post-test scores of AESCB for each group. Control group results show (N=195) participants both types of school) that mean difference is (-0.3316), and the standard deviation is (0.588) while, for active learning group (N= 565 participants from both types of school) mean difference is (-1.5877), and the standard deviation is (0.610). Similarly, for passive learning group (N= 546 participants both types of school), mean difference is (-0.7611) and standard deviation (0.548). Thus, it can be seen that the posttest scores for AESCB for each of the three groups has gone up and maximum uplift in AESCB score is for active intervention facing the group.

As the above analysis does not tells how groups differed from each other, by how much and if the difference is significant, one should perform post hoc tests where we can have a pairwise comparison between the groups. Table 71 performs the pairwise comparison of participants' difference between pre-and post-scores of AESCB.

Table 71: Multiple Comparisons of difference between pre and post AESCB scores of Primary school children

Dependent Variable: PRE_POST Tukey HSD						
(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Active	1.25609*	.04821	.000	1.1430	1.3692
Control	Passive	.42948*	.04855	.000	.3156	.5434
Active	Passive	-.82661*	.03497	.000	-.9087	-.7446
*. The mean difference is significant at the 0.05 level.						

Results from table 71 reveal that mean difference between 2 scores: 1) the difference between pre-vs. post AESCB scores for control group for all respondents and 2) the difference between pre-vs. post AESCB scores for active intervention exposed group participants is 1.256, for which significance or p = 0.000 (also shown in figure 2). Thus, we conclude that there is a significant difference between the 2 groups – control and AL group, for AESCB score from pretest to posttest. Thus, it can also be concluded that the improvement in active group scores (from pre-test to post-test) was more than the improvement in control group scores (from pretest to posttest) by 1.256 and that this difference is also a significant one.

Similarly, it can also be concluded that the improvement in passive group scores (from pretest to posttest) was more than the improvement in control group scores (from pretest to posttest) by 0.429. However, this difference is also significant at p = .05 level.

On the same lines, it can also be concluded that the improvement in active group scores (from pretest to posttest) was more than the improvement in passive group scores (from pretest to posttest) by -.82661 and that this difference too is a significant one.

AESCB mean score difference between pre-and-post test score of active learning and passive learning and control group can be easily seen in Figure 23.

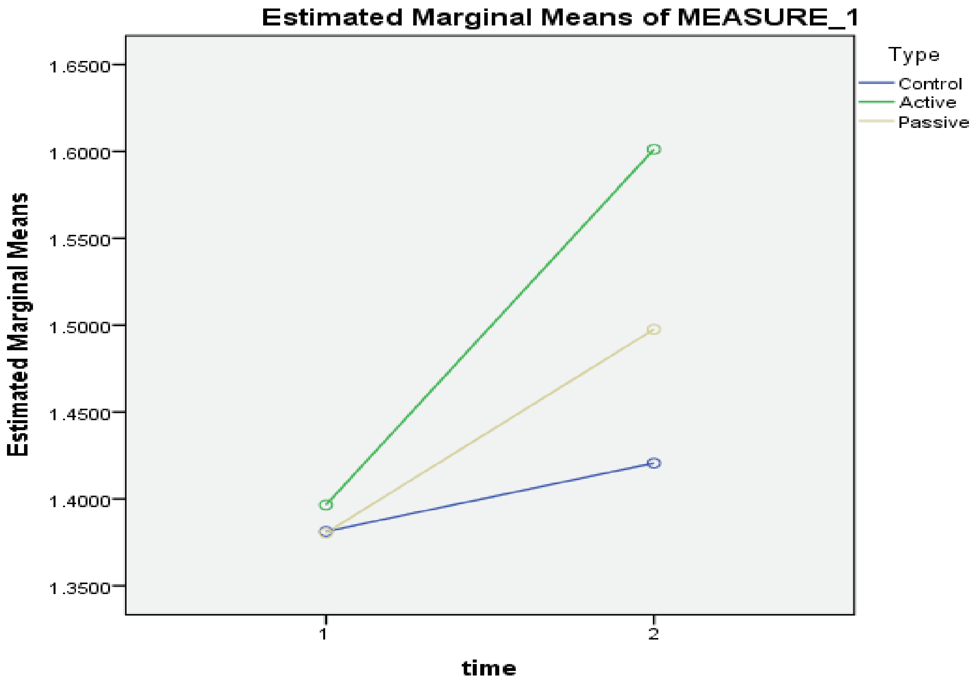


Figure 23: Mean number of AESCB per study part: means for the intervention group and control group across time

In conclusion, there was a general increase in the AESCB scores across time (pre-test to post-test) for all 3 groups. The change from before to after the intervention was significant for the active learning group. This result supports hypothesis 15a.

Additionally, it can be seen that while there is a difference in means from before to after the intervention for passive vs. control group too, the result is significant. The result, support hypothesis 16a. From table 4, it can also be seen that the difference in AESCB scores is positive and significant for AL exposed group vs. PL exposed group showing that AL group performed better in post test scores. Planned contrast revealed that there is an overall as expected effect of active and passive learning methods on scores of AESCB (although not significant for one instance).

4.4.2.1. Calculating the effect size

Effect size is a value which allows one to see how much of the independent variable (IV, here intervention) has affected the dependent variable (DV, here ESCB) in an experimental study. In other words, it looks at how much variance in your DV was a result of the IV. For generating effect size between control and intervention group 2 outputs will be needed:

a) Active vs. control group which will calculate effect size for how much of variance in AESCB scores seen in AL group is caused by intervention
b) Passive vs. control which will calculate effect size for how much of variance in AESCB scores seen in PL group is caused by intervention

Even though our t-statistic is statistically significant, this doesn't mean our effect is important in practical terms. To discover whether our effect is substantive we should calculate the effect size by converting t-value into Cohen's d-value by using the following equation where the sample size is different (Rosenthal,1991)[36],[37]:

$$d = \frac{t(n_1 + n_2)}{\sqrt{(n_1 + n_2 - 2)(n_1 n_2)}}$$

1) Effect size between Control vs Intervention (Active and Passive)

$$d = -50.317\,(196+1110) / \sqrt{(196 + 1110 - 2)\,(196*1110)}$$

$$d = -3.90148189$$

Therefore, if we see the benchmark for effect sizes this represent large effect. Therefore, as well as being statistically significant, this effect is large.

2) Effect size between control and active

$$d = -42.938\,(196+570) / \sqrt{(196 + 570 - 2)\,(196*570)}$$

$$d = -3.55965463$$

[36] https://www.polyu.edu.hk/mm/effectsizefaqs/calculator/calculator.html
[37] https://www.polyu.edu.hk/mm/effectsizefaqs/effect_size_equations2.html

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

3) **Effect size between control and passive**

$$d = - 29.740\ (196+540) / \sqrt{(196 + 540 - 2)\ (196*540)}$$

$$d = - 2.48339517$$

Therefore, if we see the benchmark for effect sizes this represent a large effect. But there is a significant, effect.

4.4.2.2. Findings:

1) There was significant effect of intervention on various groups, $F(2,1303) = 458.606$, $p < .5$.

2) Planned contrast revealed that teaching AESCB with active learning methods significantly increase AESCB score as compared to teaching with passive learning methods $t(1303) = 23.751$, $p = .000$, $r = .54$

3) The impact of active methods and passive methods are found effective and significant.

4) Impact of active methods was more effective than passive method on AESCB

5) The difference between pre-and post-score of active learning methods on AESCB was more than the passive learning and was significant

4.4.3. Results for impact of SL forms on AESCB for private school children

Assumptions on Analysis of Variance (ANOVA)

1) Assumption related to population normal distribution was checked for N= 641 and details are provided in figure 24. Graph in figure 24 represents the normal distribution curve of A/ESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

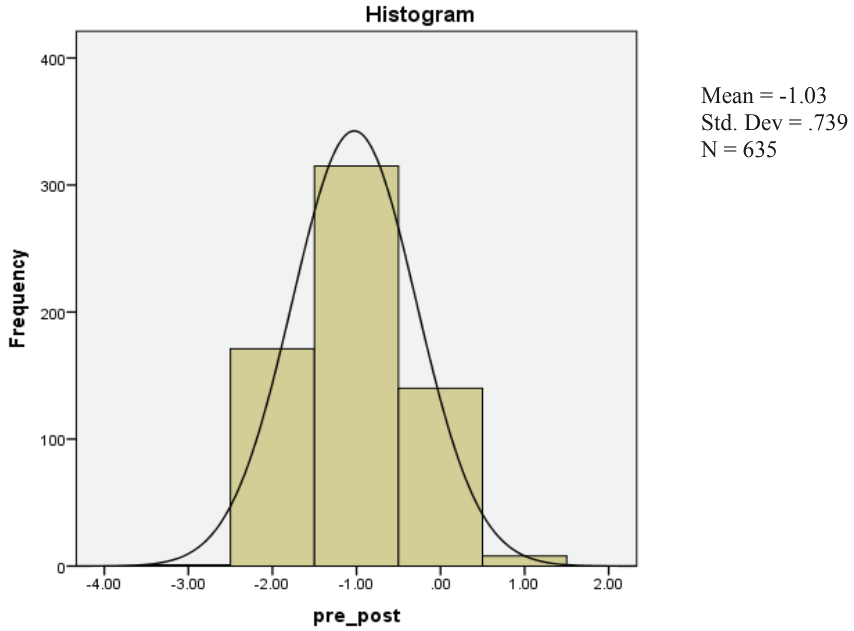


Figure 24: Normal Distribution score for AESCB for private school children

2) The 2nd assumption is that samples have to come from a randomized or randomly sampled design. It has been fulfilled in this study as the subjects were randomly assigned to three experimental groups (schools randomly selected from each group, details in the chapter on "Method").
3) The assumption of homogeneity of variance: This is tested by applying Levene's test to the data of the three group. From the Table 72, we can see that Levene's value is insignificant, i.e., the value of *Sig* is greater than .05 ($p > .05$). Thus, the variances across the three groups are significantly similar (Field, 2009). Thus, the 3rd assumption is met.

Table 72: Test of Homogeneity of Variances among the groups of private school children AESCB Scores

PRE_POST

Levene Statistic	df1	df2	Sig.
20.083	2	632	.060

Results for impact of SL forms on AESCB

As mentioned in the background note for the chapter, in the beginning, the 2nd round of analysis was carried out for checking how SL forms impact AESCB for Control vs. intervention groups among private primary school children. Running one-way ANOVA (where one factors' impact is assessed) to obtain SL form's impact on AESCB gave results given in table 73. The main focus was on the changes in the dependent variables (AESCB) from pre-intervention phase (or immediately before the intervention) to the post-intervention stage (immediately after the intervention). One-way ANOVA was performed using SPSS 16.

Table 73 is divided into between group-effects (effects due to the model-the experiment effect) and within -group effects (this is the unsystematic variation in the data). In the between group row, the value of sum of squares for the model is 118.529; while the row labeled within-group gives detail of the unsystematic variation within the data and gives value of sum of squares as 228.016

The sum of squares and the Mean squares represent the experimental effect. The mean square for the model (value of the sum of squares for "between group" divided by the corresponding degree of freedom, i.e., 2) comes to be = 59.265. The amount of unsystematic variation (value of the sum of squares for "within group" divided by the corresponding degree of freedom, i.e. (638) works out to be = 0.357.

To test whether the group means are the same, one checks the F-ratio for the combined between-group effect. The value of this ratio is 166.008 whereas critical value is 3.00 at df (2, 638). Therefore, as calculated value is greater than the critical value, we can conclude that there is a significant difference between the groups. The final column labeled *Sig* indicates the likelihood of an F-ratio the size of the one obtained occurring if there was no effect in the population. Because the observed significance value of F is less than .05, we can, therefore, conclude that there was a significant difference between the three groups in their AESCB when intervention was given in the form of active and passive.

Table 73: ANOVA statistic showing difference between groups of private school children AESCB Scores

PRE_POST

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	118.529	2	59.265	166.008	.000
Within Groups	228.016	638	.357		
Total	346.545	640			

Thus, it can be concluded from results that there is a significant difference in the AESCB scores for control vs. intervention groups. From this result, it is not possible to infer for which group – control or exposed to the intervention, had a higher pre-post difference on AESCB score.

The next section looked at data from another perspective, mixed ANOVA (check this) was conducted for the three levels of the independent variable (i.e., control group, active learning, and passive learning) to see how each group fared in pre vs. post test results. Table 74 provides the descriptive statistics for the three levels of the independent variable stated above.

Table 74: Descriptive scores of AESCB of different groups of private school children

PRE_POST				
	N	Mean	Std. Deviation	Std. Error
Control	97	-0.3299	0.59023	.05993
Active	269	-1.4944	0.66141	.04033
Passive	275	-0.8104	0.53717	.03275
Total	635	-1.0268	0.73932	.02934

Results from Table 74 indicate the mean of the difference between pre & post-test scores of AESCB for each group. Control group results show (N=97 participants for private school children) that mean difference is (-0.3299), and the standard deviation is (0.590) while, for active learning group (N= 269 participants for private school) mean difference is (-1.4944), and the standard deviation is (0.6614). Similarly, for passive learning group (N= 275 participants for private school), mean difference is (-0.8104) and standard deviation (0.537). Thus, it can be seen that the posttest scores for AESCB for each of the three groups has gone up and maximum uplift in AESCB score is for active intervention facing the group.

As the above analysis does not tells how groups differed from each other, by how much and if the difference is significant, one should perform post hoc tests where we can have a pairwise comparison between the groups. Table 75 performs the pairwise comparison of participants' difference between pre-and post-scores of AESCB

Table 75: Multiple Comparisons of difference between pre and post AESCB scores of private school children

Dependent Variable: PRE_POST Tukey HSD						
(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Active	1.16453*	0.07114	.000	.9974	1.3316
Control	Passive	0.48051*	0.07114	.000	.3134	.6476
Active	Passive	-0.68401*	0.05179	.000	-.8057	-.5623
*. The mean difference is significant at the 0.05 level.						

Results from table 75 reveal that mean difference between 2 scores: 1) the difference between pre-vs. post AESCB scores for control group for all respondents and 2) the difference between pre vs. post AESCB scores for active intervention exposed group participants is 1.164, for which significance or p = 0.000 (also shown in figure 3). Thus, we conclude that there is a significant difference between the 2 groups – control and AL group, for AESCB score from pretest to posttest. Thus, it can also be concluded that the improvement in active group scores (from pre-test to post-test) was more than the improvement in control group scores (from pretest to posttest) by 1.164 and that this difference is also a significant one.

Similarly, it can also be concluded that the improvement in passive group scores (from pretest to posttest) was more than the improvement in control group scores (from pretest to posttest) by 0.480. However, this difference is also significant at $p < .05$ level.

On the same lines, it can also be concluded that the improvement in active group scores (from pretest to posttest) was more than the improvement in passive group scores (from pretest to posttest) by -0.684 and that this difference too is a significant one.

AESCB mean score difference between pre-and-post test score of active learning and passive learning and control group can be easily seen in Figure 25.

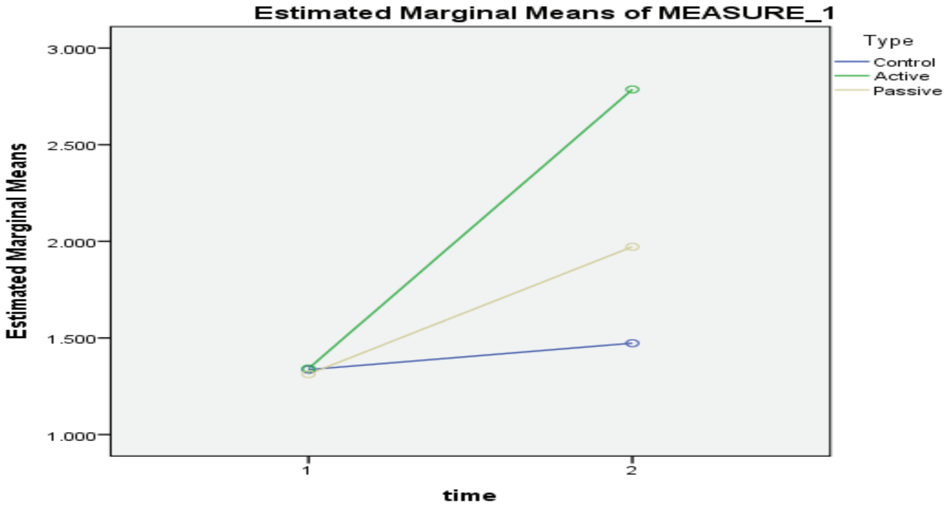


Figure 25: Mean number of AESCB (among private school children) per study part: means for the intervention group and control group across time

In conclusion, there was a general increase in the AESCB scores across time (pre-test to post-test) for all 3 groups. The change from before to after the intervention was significant for the active learning group.

From table 75, it can also be seen that the difference in AESCB scores is positive and significant for AL exposed group vs. PL exposed group showing that AL group performed better in post test scores. Planned contrast revealed that there is an overall as expected effect of active and passive learning methods on scores of AESCB.

4.4.3.1. Calculating the effect size:

Effect size is a value which allows one to see how much of the independent variable (IV, here intervention) has affected the dependent variable (DV, here ESCB) in an experimental study. In other words, it looks at how much variance in your DV was a result of the IV. For generating effect size between control and intervention group 2 outputs will be needed:

a) Active vs. control group which will calculate effect size for how much of variance in ESCB scores seen in AL group is caused by intervention

b) Passive vs. control which will calculate effect size for how much of variance in ESCB scores seen in PL group is caused by intervention

Even though our t-statistic is statistically significant, this doesn't mean our effect is important in practical terms. To discover whether our effect is substantive we should calculate the effect size by converting t-value into Cohen's d-value by using the following equation where the sample size is different (Rosenthal,1991):

$$d = \frac{t(n_1 + n_2)}{\sqrt{(n_1 + n_2 - 2)(n_1 n_2)}}$$

1) Effect size between Control vs. Intervention (Active and Passive)

$$d = -50.317\ (97+538) / \sqrt{(97 + 538 - 2)\ (97*538)}$$

$$d = -\ 3.86656827$$

Therefore, if we see the benchmark for effect sizes, this represents large effect. Therefore, as well as being statistically significant, this effect is large.

2) Effect size between control and active

$$d = -\ 27.557\ (97+269) / \sqrt{(97 + 269 - 2)\ (97*269)}$$

$$d = -\ 3.27265574$$

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

3) Effect size between control and passive

$$d = -\ 22.133\ (97+269) / \sqrt{(97 + 269 - 2)\ (97*269)}$$

$$d = -\ 2.62850417$$

Therefore, if we see the benchmark for effect sizes this represent a large effect. But there is a significant, effect.

4.3.4.2. Findings:

1) There was significant effect of intervention on various groups, $F\ (2,638) = 164.266$, $p<.5$

2) Planned contrast revealed that teaching AESCB with active learning significantly increased AESCB score as compared to passive learning methods $t\ (638) = 13.207$, $p = .000$, $r = .48$

3) The impact of active and passive methods is found effective and significant.

4) Impact of active methods was more effective than passive method on AESCB

5) The difference between pre-and post-score of active learning methods on AESCB was more than the passive learning and was significant

4.4.4. Results for impact of SL forms on AESCB for government school children

Assumptions on Analysis of Variance (ANOVA)

1) Assumption related to population normal distribution was checked for N= 641 and details are provided in the below given Figure 26. Graph given below represents the normal distribution curve of AESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

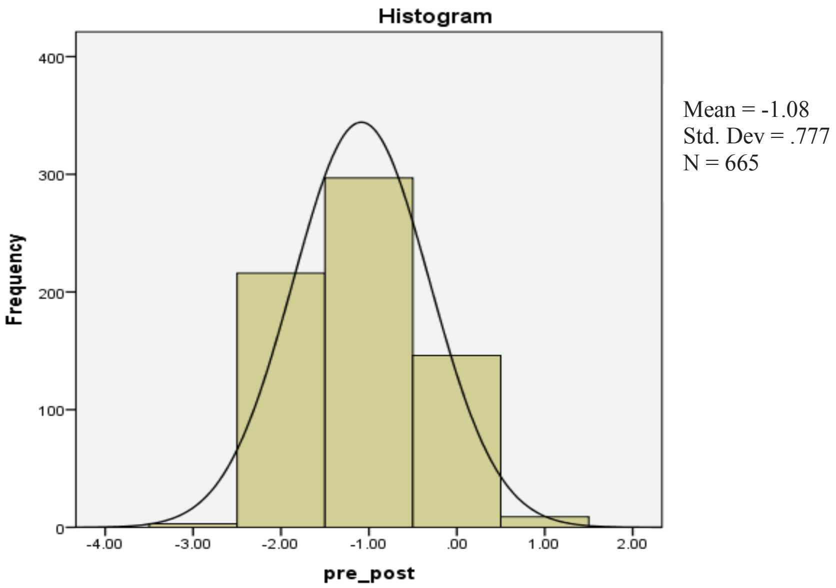


Figure 26: Normal Distribution score of AESCB for government school children

2) The 2nd assumption is that samples have to come from a randomized or randomly sampled design. It has been fulfilled in this study as the subjects were randomly assigned to three experimental groups (schools randomly selected from each group, details in the chapter on "Method").
3) The assumption of homogeneity of variance: This is tested by applying Levene's test to the data of the four group. From the table 76, we can see that Levene's value is insignificant,

i.e., the value of *Sig* is greater than .05 ($p > .05$). Thus, the variances across the three groups are significantly similar (Field, 2009). Thus, the 3rd assumption is met.

Table 76: Test of Homogeneity of Variances among the groups of government school children AESCB Scores

PRE_POST

Levene Statistic	df1	df2	Sig.
1.406	2	668	.246

Results for impact of SL forms on AESCB

As mentioned in the background note for the chapter, in the beginning, the 3rd round of analysis was carried out for checking how SL forms impact AESCB for Control vs. intervention groups among government primary school children. Running one-way ANOVA (where one factors' impact is assessed) to obtain SL form's impact on AESCB gave results given in table 77. The main focus was on the changes in the dependent variables (AESCB) from pre-intervention phase (or immediately before the intervention) to the post-intervention stage (immediately after the intervention). One-way ANOVA was performed using SPSS 16.

Table 77 is divided into between group-effects (effects due to the model-the experiment effect) and within -group effects (this is the unsystematic variation in the data). In the between group row, the value of sum of squares for the model is 196.998; while the row labeled within-group gives detail of the unsystematic variation within the data and gives value of sum of squares as 207.988

The sum of squares and the Mean squares represent the experimental effect. The mean square for the model (value of the sum of squares for "between group" divided by the corresponding degree of freedom, i.e. (2) comes to be = 98.499. The amount of unsystematic variation (value of sum of squares for "within group" divided by the corresponding degree of freedom, i.e. (662) works out to be = 313.351

To test whether the group means are the same, one checks the F-ratio for the combined between-group effect. The value of this ratio is 313.351 whereas critical value is 3.00 at df (2, 662). Therefore, as calculated value is greater than the critical value, we can conclude that there is a significant difference between the groups. The final column labeled *Sig* indicates the likelihood of an F-ratio the size of the one obtained occurring if there was no effect in the population. Because the observed significance value of F is less than .05, we can, therefore, conclude that there was a significant difference between the three groups in their ESCB when intervention was given in the form of active and passive.

Table 77: ANOVA statistic showing difference between groups of government school children AESCB Scores

PRE_POST					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	196.998	2	98.499	313.351	.000
Within Groups	207.988	662	.314		
Total	404.987	664			

Thus, it can be concluded from results that there is a significant difference in the AESCB scores for control vs. intervention groups. From this result, it is not possible to infer for which group – control or exposed to the intervention, had a higher pre-post difference on ESCB score.

The next section looked at data from another perspective, mixed ANOVA (check this) was conducted for the three levels of the independent variable (i.e., control group, active learning, and passive learning) to see how each group fared in pre vs. post test results. Table 78 provides the descriptive statistics for the three levels of the independent variable stated above.

Table 78: Descriptive AESCB scores of different groups of government school children

PRE_POST				
	N	Mean	Std. Deviation	Std. Error
Control	98	-.3333	.58902	.05920
Active	296	-1.6711	.54906	.03165
Passive	271	-.7122	.55628	.03379
Total	665	-1.0864	.77747	.03001

Results from table 78 indicate the mean of the difference between pre & post-test scores of ESCB for each group. Control group results show (N=98 participants for private school children) that mean difference is (-0.3333), and the standard deviation is (0.589) while, for active learning group (N= 296 participants for private school) mean difference is (-1.6711), and the standard deviation is (0.549). Similarly, for passive learning group (N= 271 participants for private school), mean difference is (-0.7122) and standard deviation (0.556). Thus, it can be seen that the posttest scores for AESCB for each of the three groups has gone up and maximum uplift in AESCB score is for active intervention facing the group.

As the above analysis does not tells how groups differed from each other, by how much and if the difference is significant, one should perform post hoc tests where we can have a pairwise comparison between the groups. Table 79 performs the pairwise comparison of participants' difference between pre-and post-scores of ESCB

Table 79: Multiple Comparisons of difference between pre and post AESCB scores of government school children

Dependent Variable: PRE_POST Tukey HSD						
(I) Type	(J) Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Active	1.33776*	.06465	.000	1.1859	1.4896
Control	Passive	.37884*	.06553	.000	.2249	.5328
Active	Passive	-.95892*	.04673	.000	-1.0687	-.8492
*. The mean difference is significant at the 0.05 level.						

Results from table 79 reveal that mean difference between 2 scores: 1) the difference between pre-vs. post AESCB scores for control group for all respondents and 2) the difference between pre vs. post AESCB scores for active intervention exposed group participants is 1.337, for which significance or p = 0.000 (also shown in figure 5). Thus, we conclude that there is a significant difference between the 2 groups – control and AL group, for ESCB score from pretest to posttest. Thus, it can also be concluded that the improvement in active group scores (from pre-test to post-test) was more than the improvement in control group scores (from pretest to posttest) by 1.337 and that this difference is also a significant one.

Similarly, it can also be concluded that the improvement in passive group scores (from pretest to posttest) was more than the improvement in control group scores (from pretest to posttest) by 0.378. However, this difference is significant at $p < .05$ level.

On the same lines, it can also be concluded that the improvement in active group scores (from pretest to posttest) was more than the improvement in passive group scores (from pretest to posttest) by -0.958 and that this difference too is a significant one.

AESCB mean score difference between pre-and-post test score of active learning and passive learning and control group can be easily seen in Figure 27.

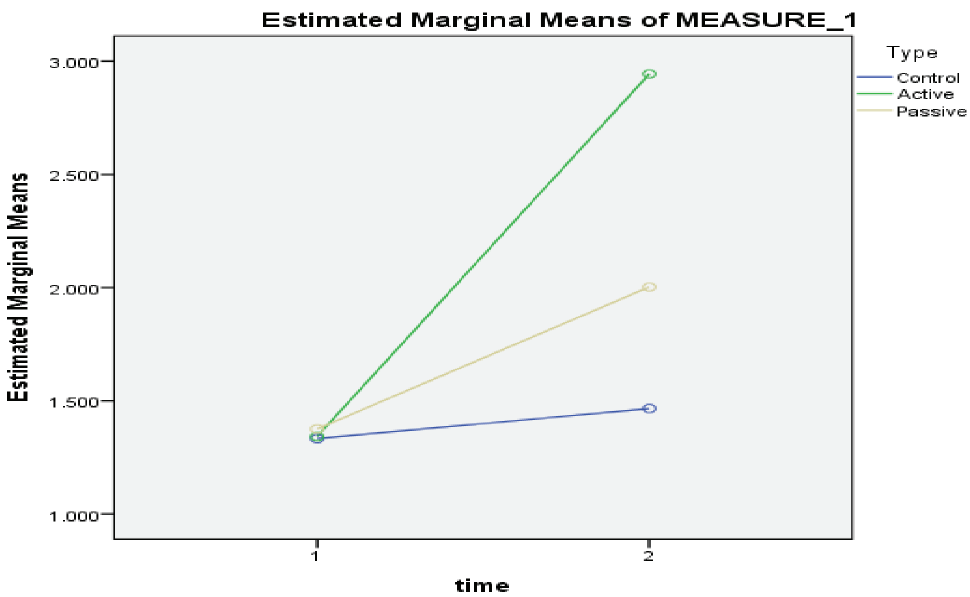


Figure 27: Mean number of AESCB (among government school children) per study part: means for the intervention group and control group across time

In conclusion, there was a general increase in the AESCB scores across time (pre-test to post-test) for all 3 groups. The change from before to after the intervention was significant for the active learning group. Additionally, it can be seen that while there is a difference in means from before to after the intervention for passive vs. control group too, the result is not significant. From table 14, it can also be seen that the difference in AESCB scores is positive and significant for AL exposed group vs. PL exposed group showing that AL group performed better in post test scores. Planned contrast revealed that there is an overall as expected effect of active and passive learning methods on scores of AESCB (although not significant for one instance).

4.4.4.1. Calculating the effect size:

Effect size is a value which allows one to see how much of the independent variable (IV, here intervention) has affected the dependent variable (DV, here ESCB) in an experimental study.

In other words, it looks at how much variance in your DV was a result of the IV. For generating effect size between control and intervention group 2 outputs will be needed:

a) Active vs. control group which will calculate effect size for how much of variance in ESCB scores seen in AL group is caused by intervention
b) Passive vs. control which will calculate effect size for how much of variance in ESCB scores seen in PL group is caused by intervention

Even though our t-statistic is statistically significant, this doesn't mean our effect is important in practical terms. To discover whether our effect is substantive we should calculate the effect size by converting t-value into Cohen's d-value by using the following equation where the sample size is different (Rosenthal,1991):

$$d = \frac{t(n_1 + n_2)}{\sqrt{(n_1 + n_2 - 2)(n_1 n_2)}}$$

1) **Effect size between Control vs. Intervention (Active and Passive)**

$$d = -36.198\ (99+572) / \sqrt{(99 + 572 - 2)\ (99*572)}$$

$$d = -\ 3.94619394$$

Therefore, if we see the benchmark for effect sizes, this represents large effect. Therefore, as well as being statistically significant, this effect is large.

2) **Effect size between control and active**

$$d = -\ 33.344\ (99+301) / \sqrt{(99 + 301 - 2)\ (99*301)}$$

$$d = -\ 3.87289130$$

Therefore, if we see the benchmark for effect sizes this represent a very large effect. Therefore, as well as being statistically significant, this effect is large.

3) **Effect size between control and passive**

$$d = -\ 19.979\ (99+271) / \sqrt{(99 + 271 - 2)\ (99*271)}$$

$$d = -\ 2.35260664$$

Therefore, if we see the benchmark for effect sizes this represent a large effect. But there is a significant large effect.

4.4.4.2. Findings:

1) There was significant effect of intervention on various groups, F (2,662) = 313.351, p<.5
2) Planned contrast revealed that teaching AESCB with active learning significantly increased AESCB score as compared to passive learning methods t (662) = 9.204, p = .000, r = .622
3) The impact of active and passive methods is found effective and significant.
4) Impact of active methods was more effective than passive method on AESCB
5) The difference between pre-and post-score of active learning methods on AESCB was more than the passive learning and was significant

Overall findings:

From section 4.4.2, 4.4.3 and 4.4.4 we can identify following three main findings:

1) Active methods were found effective and significant among all the primary school children. Including private and government school children.
2) The effect size of active learning methods with respect to control group was found greater in all the schools
3) Passive methods were found effective and significant among all the primary school children. Including private and government school children. But the effect size of active learning method was greater than passive learning methods.

4.5. Identifying the relationship between "AESCB" and "ESCB":

4.5.1. Correlation between "AESCB" and "ESCB."

Correlation analysis is carried out for testing whether the two variables are associated or not. To determine the degree of relationship between variables correlation analysis is done. Quantitatively it is represented by the coefficient of correlation. The intensity or degree of linear correlation is represented quantitatively by the coefficient of correlation. Its value ranges from -1.00 to +1.00. A value of -1.00 describes a perfectly negative correlation, and + 1.00 describes perfect positive correlation. A zero value describes the complete lack of correlation between the two variables. And the sign of coefficient indicates the direction of the relationship and numerical value its strength. Values between 0 to 0.3 indicate weak positive linear relationship, 0.3 to 0.7 indicates a moderate linear relationship and values between 0.7 to 1 indicates strong linear relationships. Correlation analysis does not prove causal direction. Correlation analysis is done using Pearson's correlation coefficient by using SPSS 16. It provides a matrix of the correlation coefficients for the two variables. Underneath each correlation coefficient both the significant value of correlation and the sample size on which it is based are displayed. Each variable is perfectly correlated with itself and so r=1 along the diagonal of the table.

Specific correlation tool used

Pearson correlation used to identify the value of correlation between attitude behaviour for the current study is one of the most relevant statistical tests used by many other researchers in similar contexts (Tanner & Wolfing, 2003; Said, Yahaya & Ahmadun 2007; Park & Ha ,2012). Correlation analysis does not prove causal direction. It is used when one explores if 2 variables are linearly related and to what degree are they associated.

Correlation analysis was done using Pearson's correlation coefficient in SPSS 16. As Pearson correlation requires that the sampling distribution has to be normally distributed. From the figure 1 given below the sampling distribution can be concluded as normally distributed because according to 68-95-99.7 rule we know that for a variable with the standard normal distribution, 68% of the observations fall between -1 and 1 (within 1 standard deviation of the mean of 0), 95% fall between -2 and 2 (within 2 standard deviations of the mean) and 99.7% fall between -3 and 3 (within 3 standard deviations of the mean). This assumption was checked for N= 1111 and details are provided in figure 28. Graph given below represents the normal distribution curve of ESCB score as we have taken 95% level of significance and our mean value lies in the range of + 2 to -2.

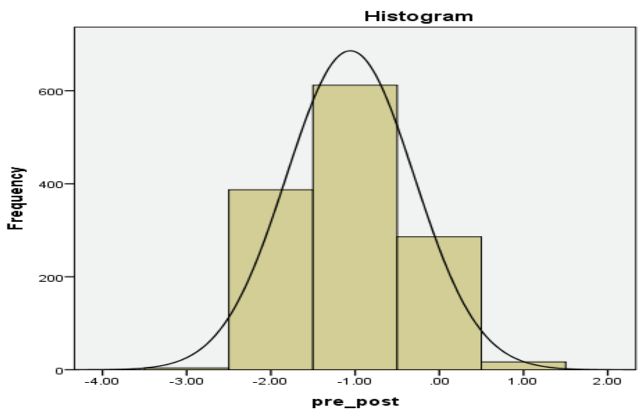


Figure 28: Normal distribution curve of ESCB for primary school children

The degree of correlation is quantitatively represented by the coefficient of correlation. The intensity or degree of linear correlation is represented quantitatively by the coefficient of correlation. Its value ranges from -1.00 to +1.00. A value of -1.00 describes a perfectly negative correlation, and + 1.00 describes perfect positive correlation. A zero value describes the complete lack of correlation between the two variables. And the sign of coefficient indicates the direction of the relationship and numerical value its strength. Values between 0 to 0.3 indicate weak positive linear relationship, 0.3 to 0.7 indicates a moderate linear relationship and values between 0.7 to 1 indicates strong linear relationships.

4.5.2 Results for correlation between "AESCB" and "ESCB"

Table 1 represents person correlation between pre-test scores of "AESCB" and "ESCB" and post-test scores of "AESCB" and "ESCB" among primary school children who were exposed to social learning tools. There was a significant relationship between the pretest scores of "AESCB" and "ESCB" when children were not exposed to social learning tools, $r = .318$, $p < .05$. But the posttest scores showed a significant increase in the relationship between "AESCB" and "ESCB" among primary school children after they have been exposed to active learning tools, $r = .552$, $p < .05$.

Hence, we can gain confidence that there is a genuine relationship shown between "AESCB" and "ESCB." As observed from Table 80, the column post-test score indicates that the relationship has increased significantly higher after the intervention has been given. This means that as the AESCB increases, the ESCB will increase. Therefore, hypothesis H17a is accepted. The strength of the relationship is moderate.

Table 80: Correlations (Active and Passive Tools)

		Pre-Test		Post-test	
		ESCB	**Attitude towards ESCB**	**ESCB**	**Attitude towards ESCB**
ESCB	Pearson Correlation	1	**.318**	**1**	**.552**
	Sig. (2-tailed)		.037		.030
	N	1111	1111	1111	1111

In this case table, 81 represents person correlation between pre-test scores of AESCB and ESCB and post-test scores of AESCB and "ESCB" among primary school children who were exposed to active learning tools. There was a significant positive relationship between the pretest scores of "AESCB" and "ESCB" when children were not exposed to active learning tools, $r = .225$, $p < .05$ (meaning that at .05 significance, attitude was directly correlated with a correlation coefficient of 0.225 which means that relationship between these two variables is not too strong). Results also showed that the posttest scores showed a significant increase in strength of the relationship between "AESCB" and "ESCB" among primary school children after they have been exposed to active learning tools, r = .458, p < .05.

Table 81: Correlations (Active Tools)

		Pre-Test		Post-test	
		ESCB	**Attitude towards ESCB**	**ESCB**	**Attitude towards ESCB**
ESCB	Pearson Correlation	1	**.227**	**1**	**.458**
	Sig. (2-tailed)		.030		.028
	N	565	565	565	565

Table 82 represents person correlation between pre-test scores of "AESCB" and "ESCB" and post-test scores of "AESCB" and "ESCB" among primary school children who were exposed to passive learning tools. There was a significant relationship between the pretest scores of "AESCB" and "ESCB" when children were not exposed to active learning tools, r = .204, p < .05. But the posttest scores showed a significant increase in the relationship between "AESCB" and "ESCB" among primary school children after they have been exposed to passive learning tools, r = .321, p < .05.

Table 82: Correlations (Passive Tools)

		Pre-Test		Post-test	
		ESCB	**Attitude towards ESCB**	**ESCB**	**Attitude towards ESCB**
ESCB	Pearson Correlation	1	**.204**	**1**	**.321**
	Sig. (2-tailed)		.012		.000
	N	546	546	546	546