CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

4.0 Introduction

The purpose of this study was to identify misconceptions in science among students of standard VIII. In the previous chapter, selection of sample, tools and techniques, design of the study and data analysis technique were presented in detail. This chapter reports analysis and interpretation of data. The data collected with the help of Three-Tiered Multiple Choice Science Misconception Test were quantitative in nature. Appropriate statistical techniques were employed for analyzing the data and interpretation were drawn from the analysis outputs. Moreover, hypotheses were tested and decisions regarding rejection of the hypotheses were taken.

4.1 Analysis of Data

The data for the present study was analysed through frequency, percentage, t-test and ANOVA. The detailed analysis of each objective is as follows:

4.1.1 To identify misconceptions in science among students of standard VIII

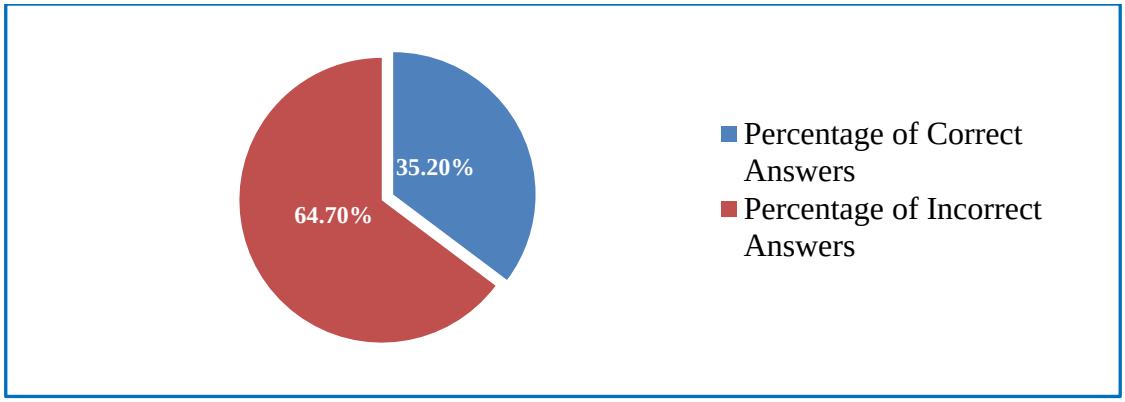
The data for above objective was obtained from students through Three-Tiered Multiple Choice Science Misconception Test (TTMCSMT) which had 76 questions. The mean and the percentage of scores obtained by students in the first-tier are represented in the table below:

Table 4.1 Mean and Percentage of Scores of All Students in TTMCSMT (First-Tier)

Total No. of Students	Total No. of Questions	Mean of Correct Answers	Mean of Incorrect Answers
926	76	26.75 (35.20%)	49.25 (64.80%)

From table 4.1 it is evident that the average score of correct answer is 26.75 and the average score of incorrect answer is 49.25. From the table it is also evident that 35.20 percent of students had given correct answers and 64.70 percent of students had given incorrect answers.

Graph_4.1 Overall Performance of Students in TTMCSMT



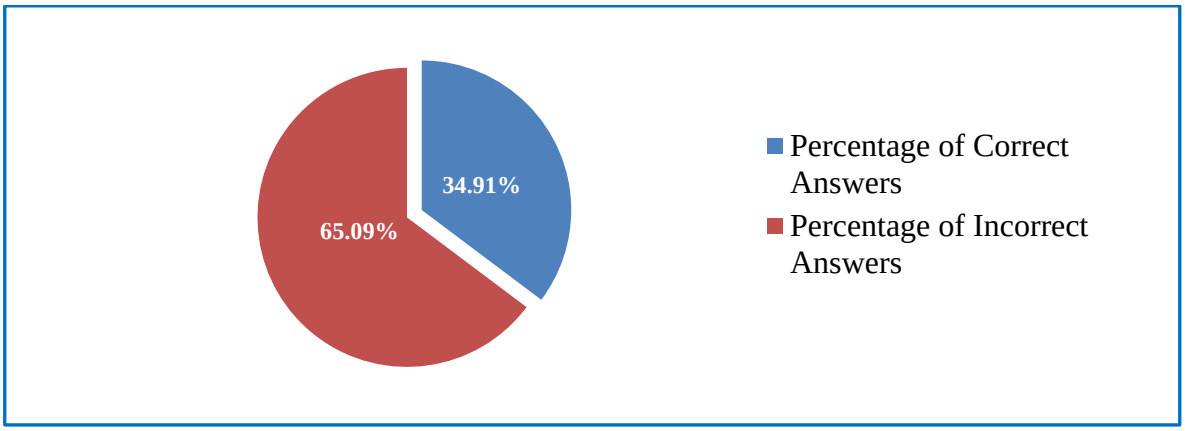
From the graph 4.1 it is evident that majority of students had given incorrect answers in the first tier of Three-tiered Multiple Choice Science Misconception Test (TTMCSMT).

Table 4.2 Mean and Percentage of Scores of All Students in Physics (TTMCSMT-First-Tier)

Total No. of Students	Total No. of Questions	Mean of Correct Answers	Mean of Incorrect Answers
926	25	8.72 (34.91 %)	16.27 (65.09 %)

From Table 4.2 it is evident that the average score of correct answers in Physics is 8.72 and the average score of incorrect answers in Physics is 16.27. From the table it is also evident that 34.91 percent of students had given correct answers in Physics and 65.09 percent of students had given incorrect answers in Physics.

Graph_4.2 Overall Performance of Students in TTMCSMT (Physics)



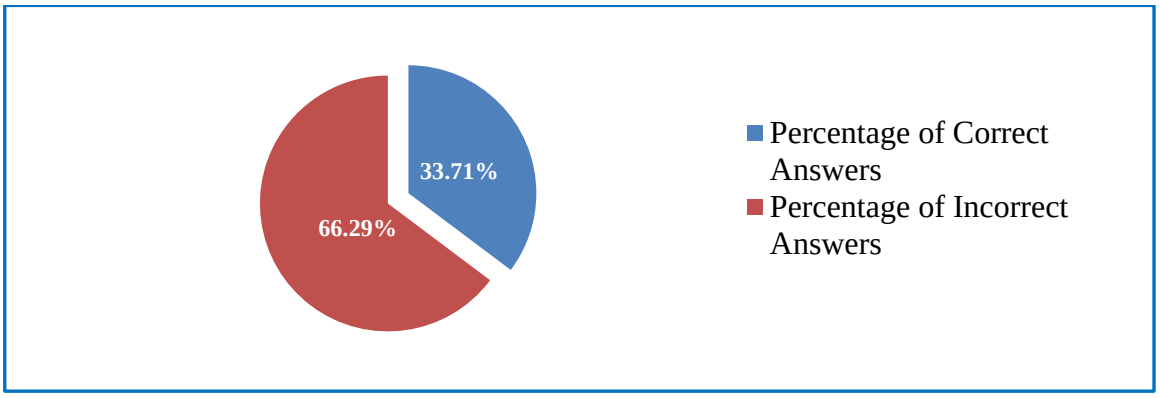
From the graph 4.2 it is evident that majority of students had given incorrect answers in the first tier of Three-tiered Multiple Choice Science Misconception Test (TTMCSMT) in Physics.

Table 4.3 Mean and Percentage of Scores of All Students in Chemistry (TTMCSMT-First-Tier)

Total No. of Students	Total No. of Questions	Mean of Correct Answers	Mean of Incorrect Answers
926	24	8.08 (33.71 %)	15.91 (66.29 %)

From Table 4.3 it is evident that the average score of correct answers in Chemistry is 8.08 and the average score of incorrect answers in Chemistry is 15.91.From the table it is also evident that 33.71 percent of students had given correct answers in Chemistry and 66.29 percent of students had given incorrect answers in Chemistry.

Graph_4.3 Overall Performance of Students in TTMCSMT (Chemistry)



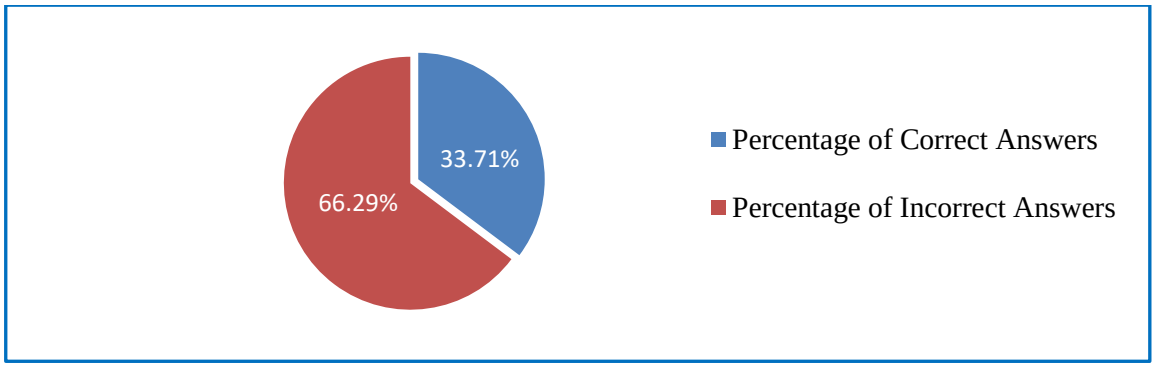
From the graph 4.3 it is evident that majority of students had given incorrect answers in the first tier of Three-tiered Multiple Choice Science Misconception Test (TTMCSMT) in Chemistry.

Table 4.4 Mean and Percentage of Scores of All Students in Biology (TTMCSMT-First-Tier)

Total No. of Students	Total No. of Questions	Mean of Correct Answers	Mean of Incorrect Answers
926	27	9.94 (36.82 %)	17.06 (63.18%)

From Table 4.4 it is evident that the average score of correct answers in Biology is 9.94 and the average score of incorrect answers in Biology is 17.06. From Table it is also evident that 36.82 percent of students had given correct answers in Biology and 63.18 percent of students had given incorrect answers in Biology.

Graph_4.4 Overall Performance of Students in TTMCSMT (Biology)



From the graph 4.4 it is evident that majority of students had given incorrect answers in the first tier of Three-tiered Multiple Choice Science Misconception Test (TTMCSMT) Biology.

It can be observed from the above tables that the percentage of students answering the questions correctly is around 35 percent and percentage of students answering the questions incorrectly is around 67 percent in all the three branches of Science i.e. Physics, Chemistry and Biology. Thus, it can be concluded that majority of students had given incorrect answers.

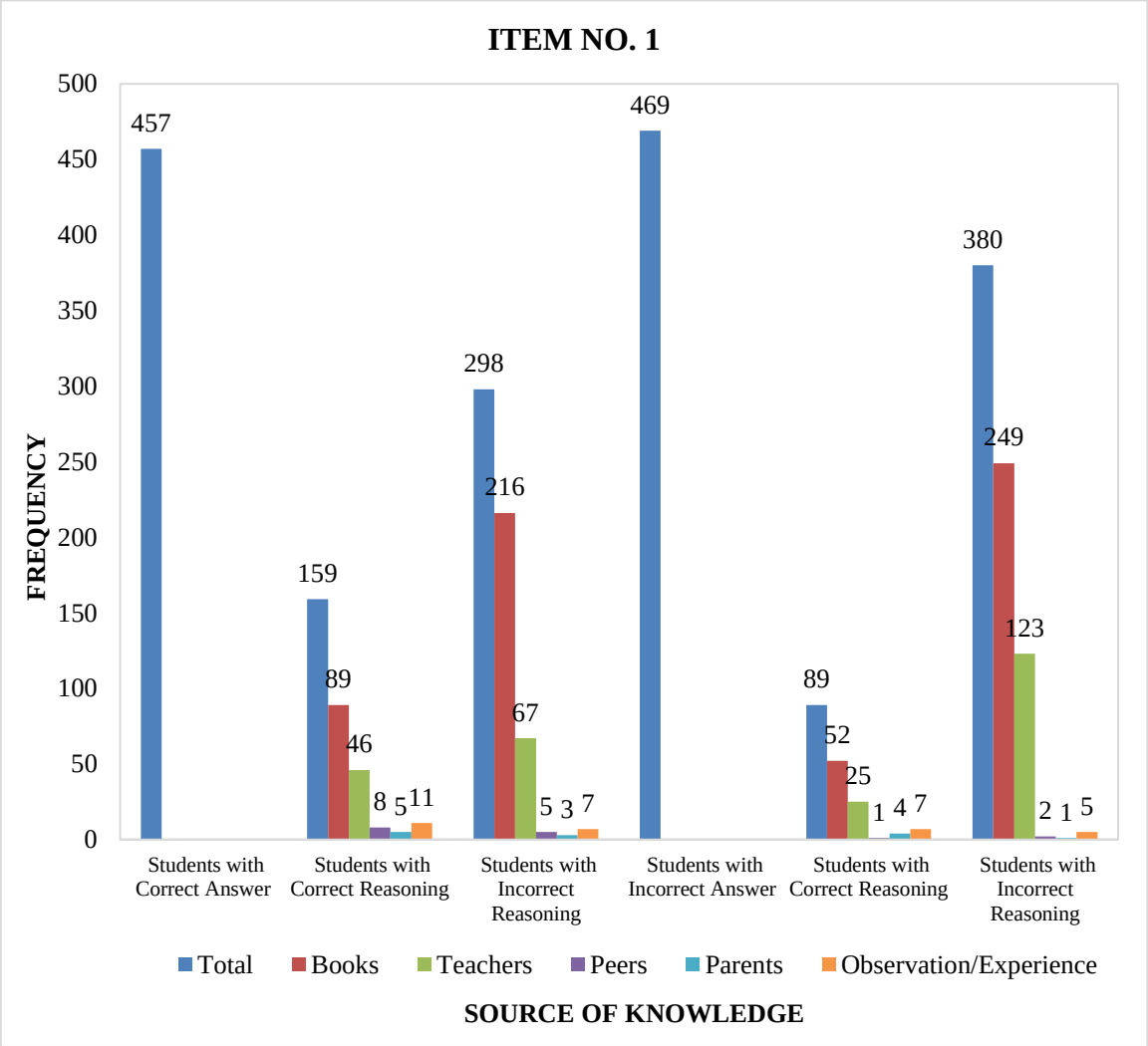
4.1.2 To study the reasons and sources of misconceptions in science among students of standard VIII

The data for above objective was obtained from students through Three-Tiered Multiple Choice Science Misconception Test (TTMCSMT) which had 76 questions. The data was analysed through frequency and percentage. The findings are tabulated below:

Table_4.5 Student's Reasons and Source of Knowledge (Physics)

Item No. 1	School bags with thick strap are more comfortable than thin strap.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	457(49.36)	159(34.80)	298(65.20)	469(50.64)	89(18.97)	380(81.03)
Source of Knowledge						
Books		89(55.97)	216(72.48)		52(58.43)	249(65.53)
Teachers		46(28.93)	67(22.48)		25(28.09)	123(32.37)
Peers		8(5.03)	5(1.68)		1(1.12)	2(0.53)
Parents		5(3.14)	3(1.01)		4(4.49)	1(0.26)
Observation /Experience		11(6.92)	7(2.35)		7(7.87)	5(1.32)

Graph_4.5 Student's Reason and Source of Knowledge (Physics)



From table and graph 4.5 it is evident that regarding item No. 1 out of 926 students 457 (49.36%) students had given correct answers. Out of 457 (49.36%) students who had given correct answers 159 (34.80 %) students had given correct reasoning while 298 (65.20 %) students had given incorrect reasoning. Out of 159 (34.80%) students who had given correct reasoning 89 (55.97%) students considered books as their primary source of knowledge followed by teachers-46 (28.93%), peers-8 (5.03%), parents-5 (3.14%) and observation/experience-11 (6.92%). Out of 298 (65.20%) students who had given incorrect reasoning 216 (72.48%) students considered books as their primary source of knowledge followed by teachers-67 (22.48%), peers-5 (1.68%), parents-3 (1.01%) and observation/experience-7 (2.35%).

While out of 926 students 469 (50.64%) students had given incorrect answers. Out of 469 (50.64%) students who had given incorrect answers 89 (18.97%) students had given correct reasoning while 380 (81.03%) students had given incorrect reasoning. Out of 89 (18.97%) students who had given correct reasoning, 52 (58.53%) students considered books as their primary source of knowledge followed by teachers-25 (28.09%), peers-1 (1.12%), parents-4 (4.49%) and observation/experience-7 (7.87%). Out of 380 (81.03 %) students who had given incorrect reasoning, 249 (65.53%) students considered books as their primary source of knowledge followed by teachers-123 (32.37%), peers-2 (0.53 %), parents-1 (0.26 %) and observation/experience-5 (1.32%).

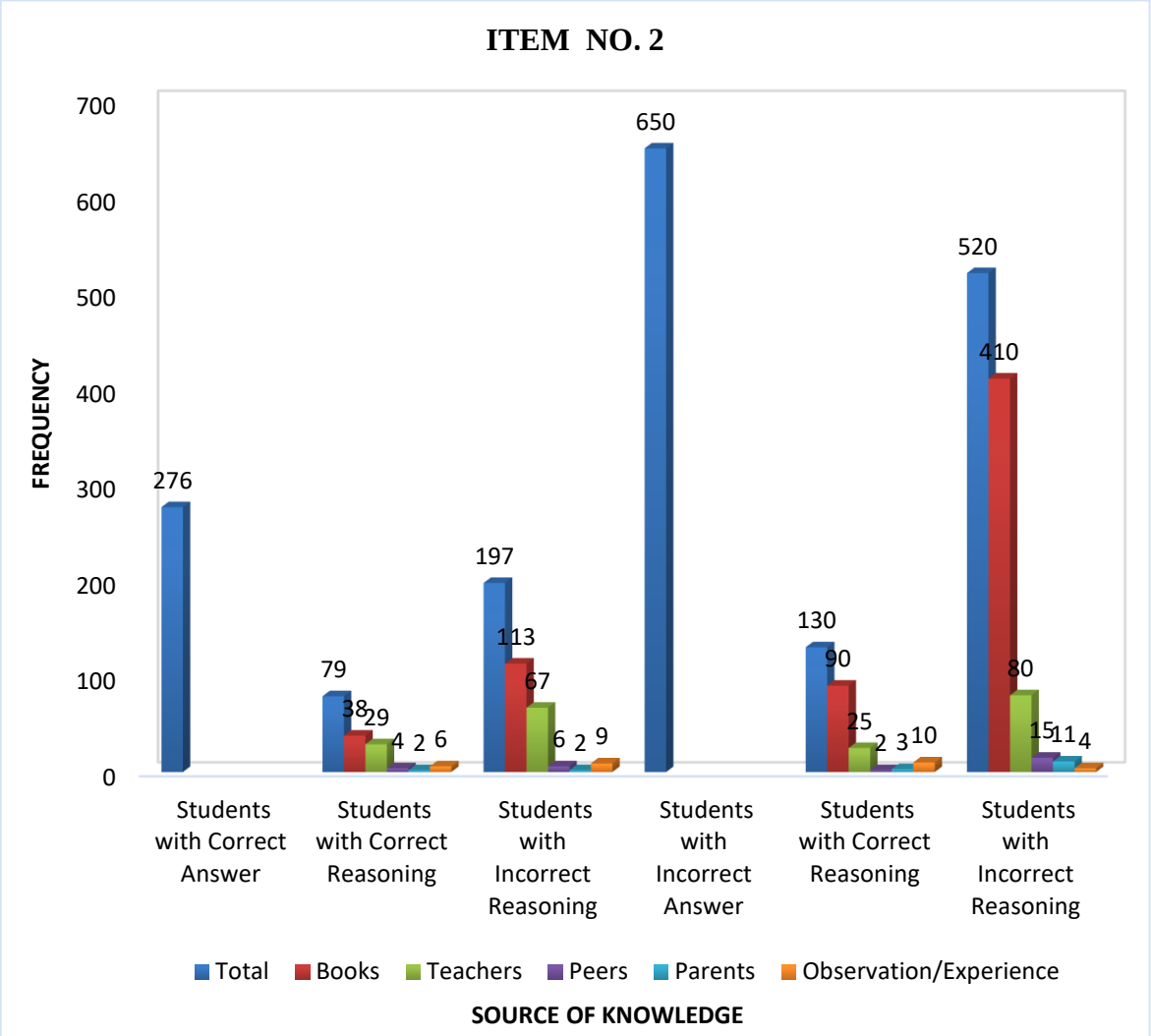
Out of 926 students 606 (65.44%) students considered books as their primary source of knowledge followed by teachers 261 (28.18%), peers 16 (1.72%), parents 13 (1.40%) and observations/experiences 30 (3.23%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 159 (17.17%) students had complete understanding of concept, 387 (41.79%) students had partial understanding of concept and 380 (41.04%) students had complete misunderstanding of concept or misconception.

Table_4.6 Student's Reasons and Source of Knowledge (Physics)

Item No. 2	Frictional force is applied when an archer pulls the string of a bow.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	276(29.81)	79(28.62)	197(71.38)	650(70.19)	130(20.00)	520(80.00)
Source of Knowledge						
Books		38(48.10)	113(57.36)		90(69.23)	410(78.85)
Teachers		29(36.17)	67(34.01)		25(19.23)	80(15.38)
Peers		4(5.06)	6(3.05)		2(1.54)	15(2.88)
Parents		2(2.53)	2(1.02)		3(2.31)	11(2.12)
Observation /Experience		6 (7.59)	9(4.57)		10(7.69)	4(0.77)

Graph_4.6 Student's Reason and Source of Knowledge (Physics)



From table and graph 4.6 it is evident that regarding item No. 2 out of 926 students 276 (29.81%) students had given correct answers. Out of 276 (29.81%) students who had given correct answers 79 (28.62%) students had given correct reasoning while 197 (71.38%) students had given incorrect reasoning. Out of 79 (28.62%) students who had given correct reasoning 38 (48.10%) students considered books as their primary source of knowledge followed by teachers-29 (36.17%), peers-4 (5.06%), parents-2 (2.53%) and observation/experience-6 (7.59%). Out of 197 (71.38%) students who had given incorrect reasoning 113 (57.36%) students considered books as their primary source of knowledge followed by teachers-67 (34.10%), peers-6 (3.05%), parents-2 (1.02%) and observation/experience-9 (4.57%).

While out of 926 students 650 (70.19%) students had given incorrect answers. Out of 650 (70.19%) students who had given incorrect answers 130 (20.00%) students had given correct reasoning while 520 (80%) students had given incorrect reasoning. Out of 130 (20%) students who had given correct reasoning, 90 (69.23%) students considered books as their primary source of knowledge followed by teachers-25 (19.23%), peers-2 (1.54%), parents-3 (2.31%) and observation/experience-10 (7.69%). Out of 520 (80%) students who had given incorrect reasoning, 410 (78.85%) students considered books as their primary source of knowledge followed by teachers-80 (15.38%), peers-15 (2.88 %), parents-11 (2.12%) and observation/experience-4 (0.77%).

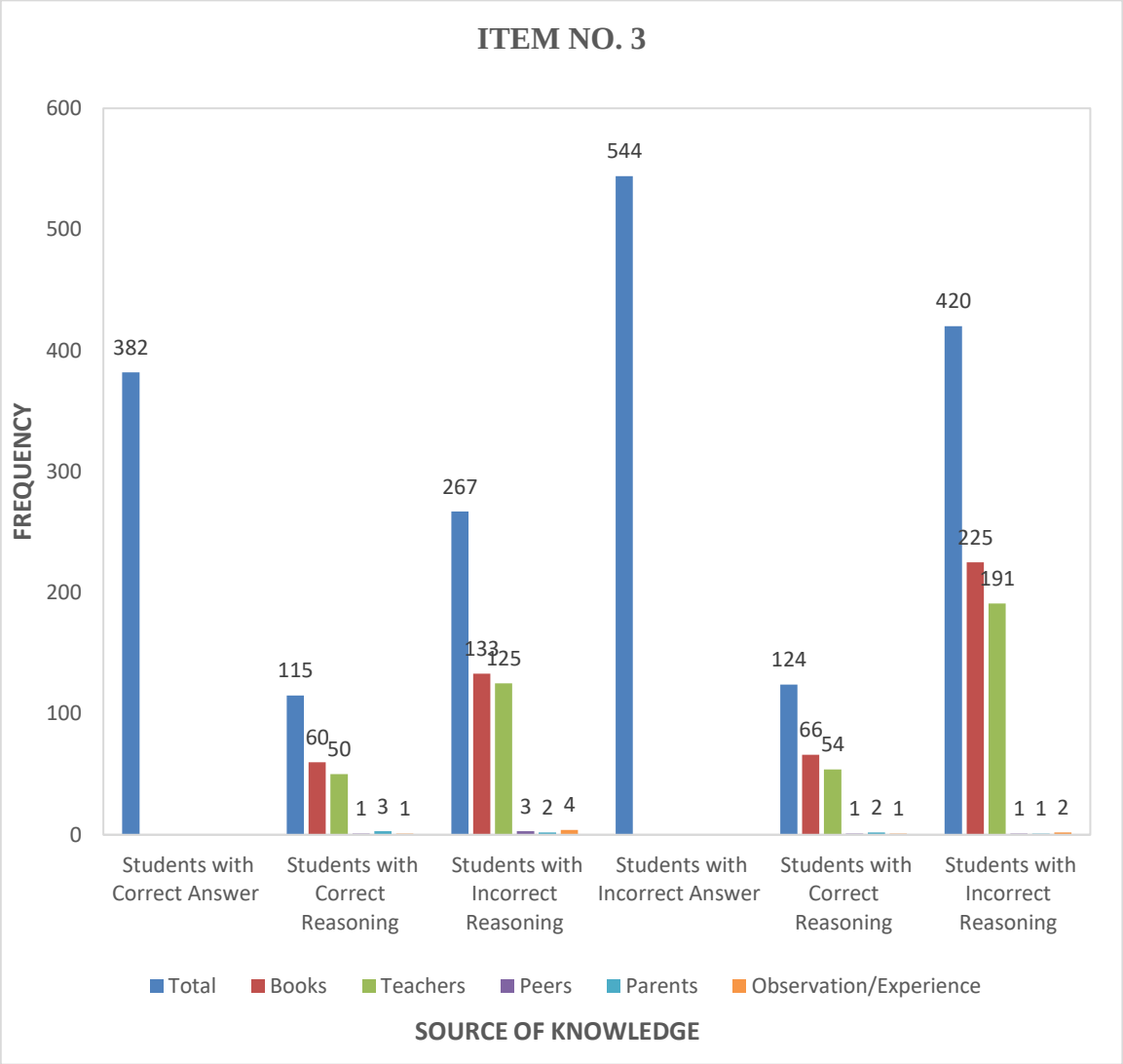
Out of 926 students 651 (70.30%) students considered books as their primary source of knowledge followed by teachers 201 (21.70%), peers 27 (2.91%), parents 18 (1.94%) and observations/experiences 29 (3.13%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 79 (8.53%) students had complete understanding of concept, 327 (35.31 %) students had partial understanding of concept and 520 (56.16 %) students had complete misunderstanding of concept or misconception.

Table_4.7 Student's Reasons and Source of Knowledge (Physics)

Item No. 3	**Force is a vector quantity.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & (%) of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**382(41.30)**	**115(30.10)**	**267(69.90)**	**544(58.70)**	**124(22.79)**	**420(77.21)**
Source of Knowledge						
Books		**60(52.17)**	**133(49.81)**		**66(53.23)**	**225(53.57)**
Teachers		**50(43.48)**	**125(46.82)**		**54(43.55)**	**191(45.48)**
Peers		**1(0.87)**	**3(1.12)**		**1(0.81)**	**1(0.24)**
Parents		**3(2.61)**	**2(0.75)**		**2(1.61)**	**1(0.24)**
Observation /Experience		**1(0.87)**	**4(1.50)**		**1(0.81)**	**2(0.48)**

Graph_4.7 Student's Reason and Source of Knowledge (Physics)



From table and graph 4.7 it is evident that regarding item No. 3 out of 926 students 382 (41.30%) students had given correct answers. Out of 382 (41.30%) students who had given correct answers 115 (30.10%) students had given correct reasoning while 267 (69.90 %) students had given incorrect reasoning. Out of 115 (30.10%) students who had given correct reasoning 60 (52.17%) students considered books as their primary source of knowledge followed by teachers-50 (43.48%), peers-1 (0.87%), parents-3 (2.61%) and observation/experience-1 (0.87%). Out of 267 (69.90%) students who had given incorrect reasoning 133 (49.81%) students considered books as their primary source of knowledge followed by teachers-125 (46.82%), peers-3 (1.12%), parents-2 (0.75 %) and observation/experience-4 (1.50%).

While out of 926 students 544 (58.70%) students had given incorrect answers. Out of 544 (58.70%) students who had given incorrect answers 124 (22.97%) students had given correct reasoning while 420 (77.21%) students had given incorrect reasoning. Out of 124 (22.97%) students who had given correct reasoning, 66 (53.23%) students considered books as their primary source of knowledge followed by teachers-54 (43.55 %), peers-1 (0.81 %), parents-2 (1.61%) and observation/experience-1 (0.81%). Out of 420 (77.21 %) students who had given incorrect reasoning, 225 (53.57%) students considered books as their primary source of knowledge followed by teachers-191 (45.48 %), peers-1(0.24 %), parents-1 (0.24%) and observation/experience-2 (0.48%).

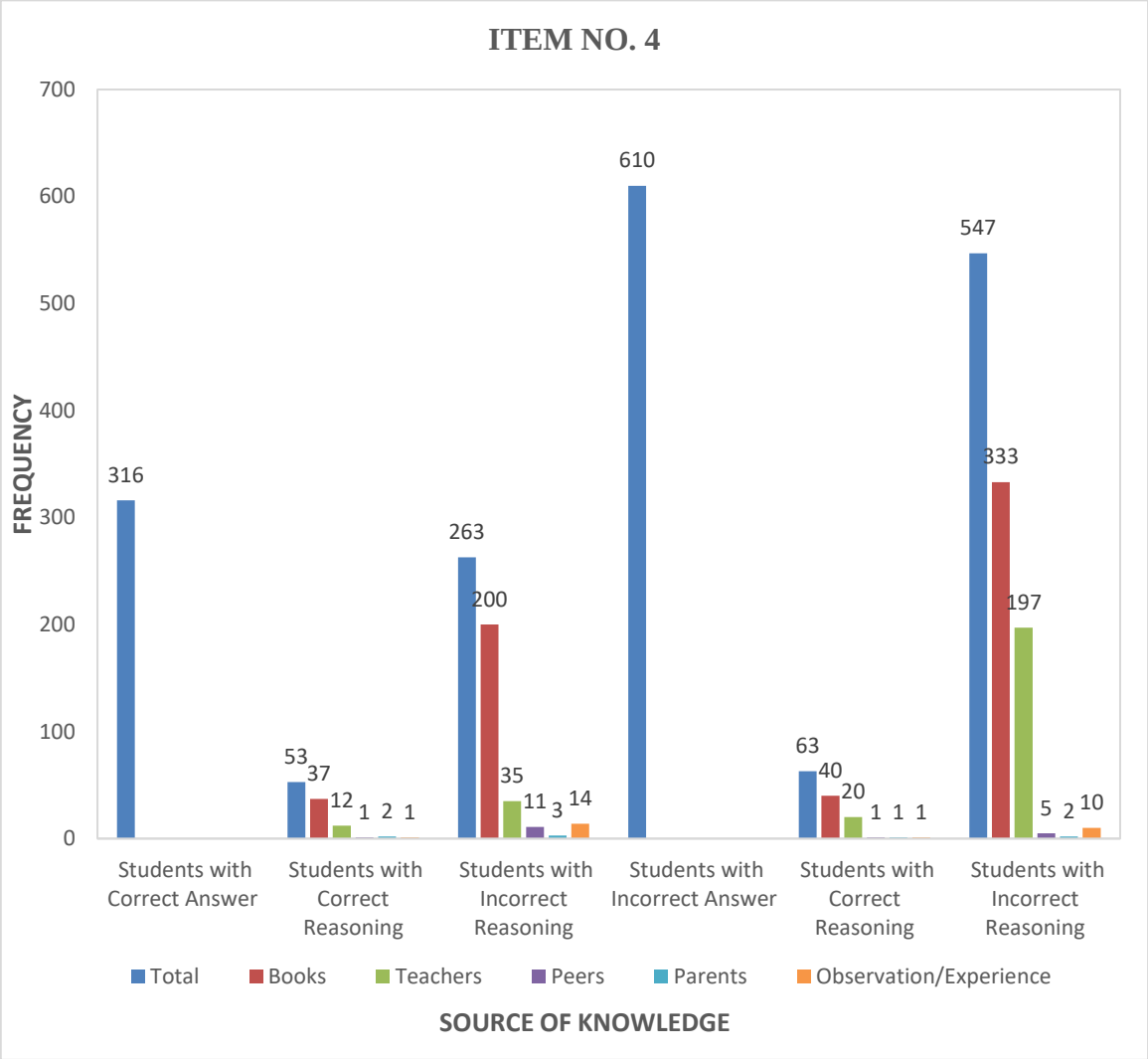
Out of 926 students 484 (52.26%) students considered books as their primary source of knowledge followed by teachers 420 (45.35%), peers 6 (0.64%), parents 8 (0.86%) and observations/experiences 8 (0.86%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 115 (12.42%) students had complete understanding of concept, 391 (42.22%) students had partial understanding of concept and 420 (45.36%) students had complete misunderstanding of concept or misconception.

Table_4.8 Student's Reasons and Source of Knowledge (Physics)

Item No. 4	Bullocks use gravitational force to pull a cart.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	316(34.10)	53(16.77)	263(88.23)	610(65.90)	63(10.33)	547(89.67)
Source of Knowledge						
Books		37(69.81)	200(76.05)		40(93.49)	333(60.88)
Teachers		12(22.64)	35(13.31)		20(31.75)	197(36.01)
Peers		1(1.89)	11(4.18)		1(1.59)	5(0.91)
Parents		2(3.77)	3(1.14)		1(1.59)	2(0.37)
Observation /Experience		1(1.89)	14(5.32)		1(1.59)	10(1.83)

Graph_4.8 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.8 it is evident that regarding item No. 4 out of 926 students 316 (34.10%) students had given correct answers. Out of 316 (34.10%) students who had given correct answers 53 (16.77%) students had given correct reasoning while 263 (88.23%) students had given incorrect reasoning. Out of 53 (16.77%) students who had given correct reasoning 37 (69.81%) students considered books as their primary source of knowledge followed by teachers-12 (22.64%), peers-1 (1.89 %), parents-2 (3.77%) and observation/experience-1 (1.89%). Out of 263 (88.23%) students who had given incorrect reasoning 200 (76.05%) students considered books as their primary source of knowledge followed by teachers-35 (13.31%), peers-11 (4.18%), parents-3 (1.14%) and observation/experience-14 (5.32%).

While out of 926 students 610 (65.90%) students had given incorrect answers. Out of 610 (65.90%) students who had given incorrect answers 63 (10.33%) students had given correct reasoning while 547 (89.67%) students had given incorrect reasoning. Out of 63 (10.33%) students who had given correct reasoning, 40 (93.49%) students considered books as their primary source of knowledge followed by teachers-20 (31.75%), peers-1 (1.59 %) , parents-1(1.59 %) and observation/experience-1 (1.59 %). Out of 547 (89.67 %) students who had given incorrect reasoning, 333 (60.88%) students considered books as their primary source of knowledge followed by teachers-197 (36.01%), peers-5 (0.91 %), parents-2 (0.37%) and observation/experience-10 (1.83%).

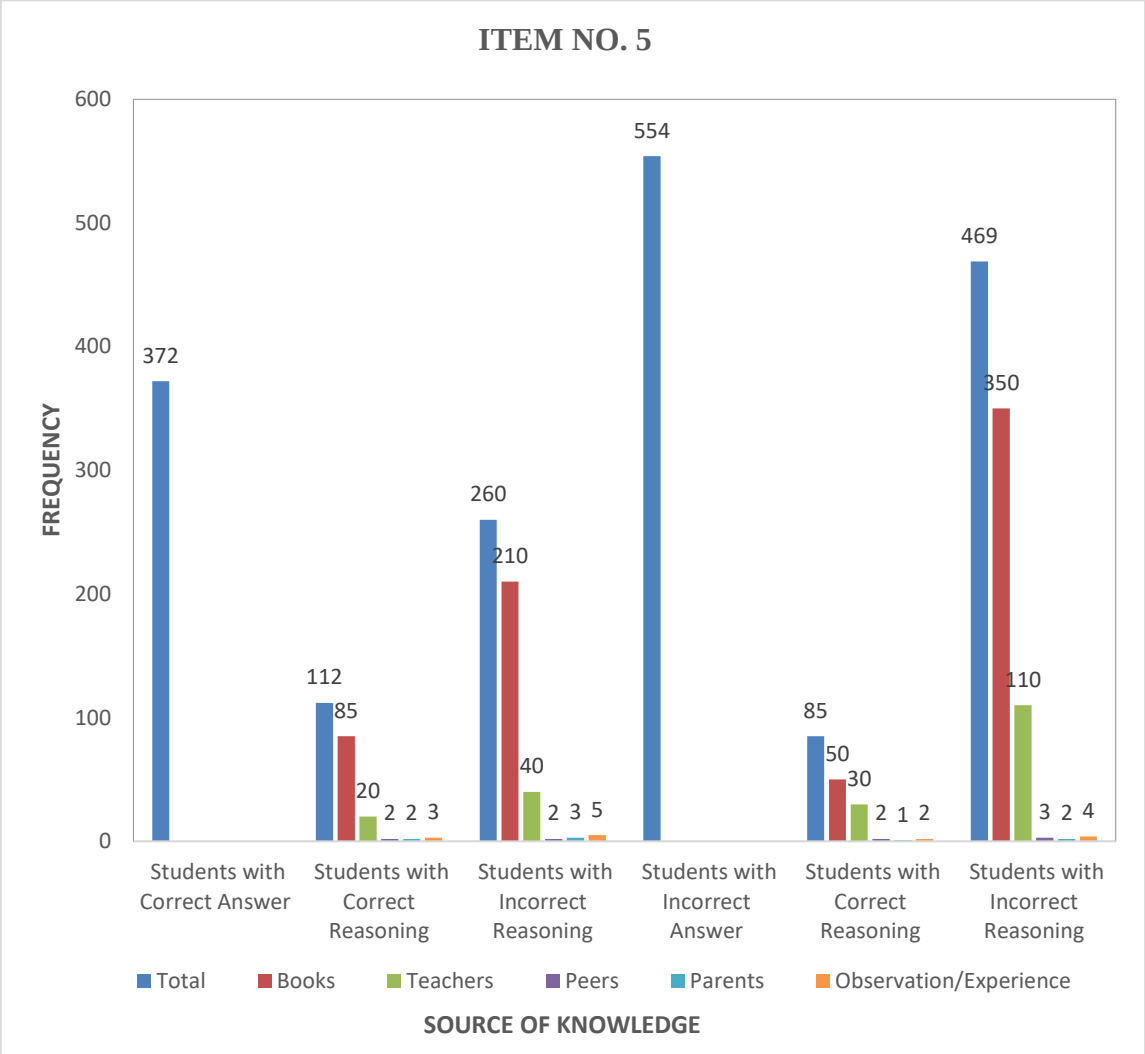
Out of 926 students 610 (65.87%) students considered books as their primary source of knowledge followed by teachers 264 (28.50%), peers 18 (1.94%), parents 8 (0.86%) and observations/experiences 26 (2.80%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 53 (5.72%) students had complete understanding of concept, 326 (35.20%) students had partial understanding of concept and 547 (59.08%) students had complete misunderstanding of concept or misconception.

Table_4.9 Student's Reasons and Source of Knowledge (Physics)

Item No. 5	**Atmospheric pressure is the force of air exerted on any surface.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & (%) of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**372(40.20)**	**112(30.10)**	**260(69.90)**	**554(59.80)**	**85(15.34)**	**469(84.66)**
Source of Knowledge						
Books		**85(75.89)**	**210(80.77)**		**50(58.82)**	**350(74.63)**
Teachers		**20(17.86)**	**40(15.38)**		**30(35.29)**	**110(23.45)**
Peers		**2(1.79)**	**2(0.77)**		**2(2.35)**	**3(0.64)**
Parents		**2(1.79)**	**3(1.15)**		**1(1.18)**	**2(0.43)**
Observation/ Experience		**3(2.68)**	**5(1.92)**		**2(2.35)**	**4(0.85)**

Graph_4.9 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.9 it is evident that regarding item No. 5 out of 926 students 372 (40.20%) students had given correct answers. Out of 372 (40.20%) students who had given correct answers 112 (30.10%) students had given correct reasoning while 260 (69.90%) students had given incorrect reasoning. Out of 112 (30.10%) students who had given correct reasoning 85 (75.89%) students considered books as their primary source of knowledge followed by teachers-20 (17.86%), peers-2 (1.79%), parents-2 (1.79%) and observation/experience-3 (2.68%). Out of 260 (69.90%) students who had given incorrect reasoning 210 (80.77%) students considered books as their primary source of knowledge followed by teachers-40 (15.38%), peers-2 (0.77%), parents-3 (1.15%) and observation/experience-5 (1.92%).

While out of 926 students 554 (59.80%) students had given incorrect answers. Out of 554 (59.80%) students who had given incorrect answers 85 (15.34%) students had given correct reasoning while 469 (84.66%) students had given incorrect reasoning. Out of 85 (15.34 %) students who had given correct reasoning, 50 (58.82%) students considered books as their primary source of knowledge followed by teachers-30 (35.29%), peers-2 (2.35%), parents-1 (1.18%) and observation/experience-2 (2.35%). Out of 469 (84.66 %) students who had given incorrect reasoning 350 (74.63%) students considered books as their primary source of knowledge followed by teachers-110 (23.14%), peers-3 (0.64 %), parents-2 (0.43 %) and observation/experience-4 (0.85%).

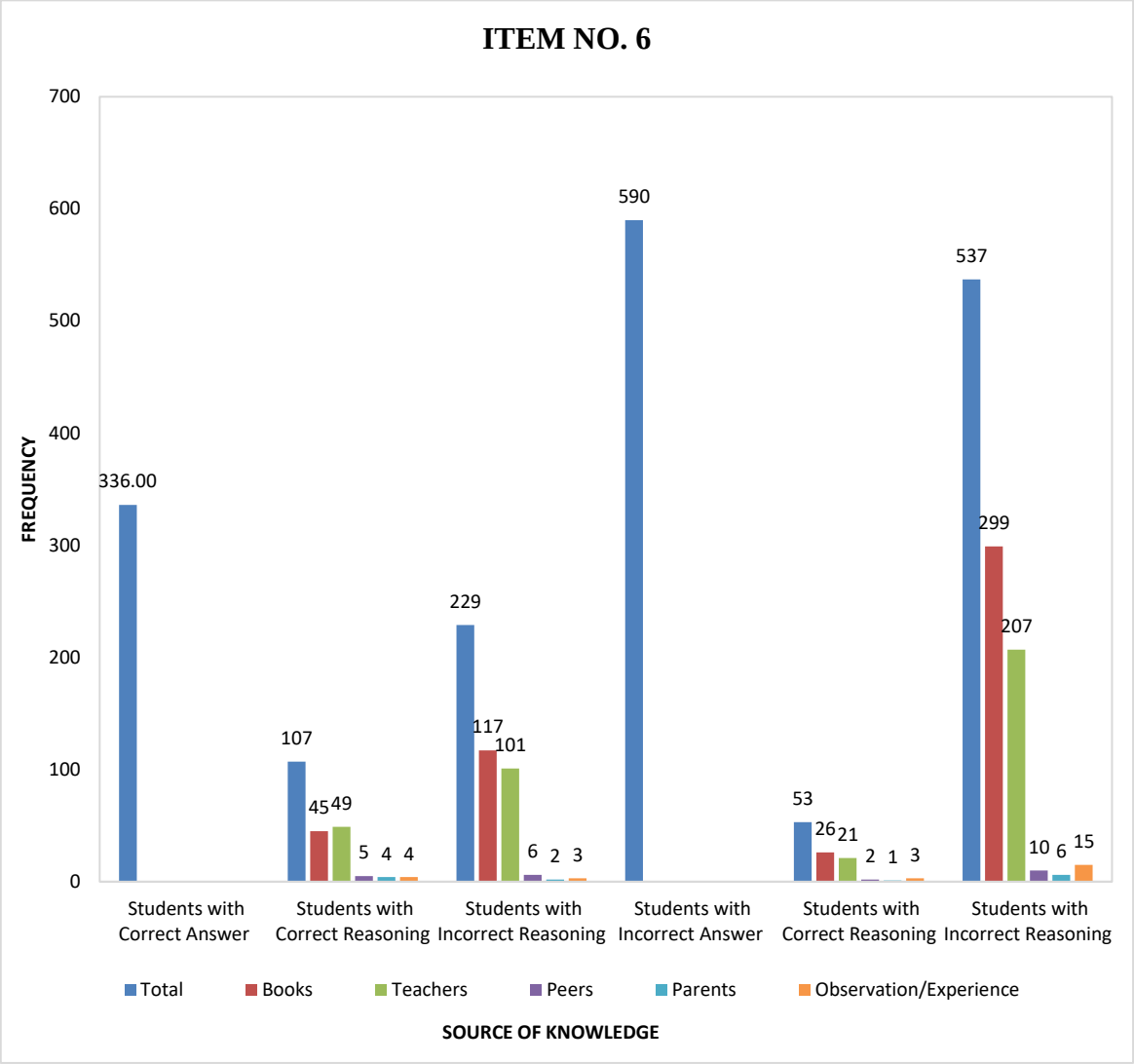
Out of 926 students 695 (75.05%) students considered books as their primary source of knowledge followed by teachers 200 (21.59 %), peers 9 (0.97%), parents 8 (0.86%) and observations/experiences 14 (1.51%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 112 (12.09%) students had complete understanding of concept, 345 (37.26%) students had partial understanding of concept and 469 (50.65%) students had complete misunderstanding of concept or misconception.

Table_4.10 Student's Reasons and Source of Knowledge (Physics)

Item No. 6	Roshan can deflate a balloon much easily by his finger than a needle.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%)of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	336(36.30)	107(31.84)	229(68.16)	590(63.70)	53(8.98)	537(91.02)
Source of Knowledge						
Books		45(42.06)	117(51.09)		26(49.06)	299(55.68)
Teachers		49(45.79)	101(44.10)		21(39.62)	207(38.55)
Peers		5(4.67)	6(2.62)		2(3.77)	10(1.86)
Parents		4(3.74)	2(0.87)		1(1.89)	6(1.12)
Observation /Experience		4(3.74)	3(1.31)		3(5.66)	15(2.79)

Graph_4.10 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.10 it is evident that regarding item No. 6 out of 926 students 336 (36.30 %) students had given correct answers. Out of 336 (36.30%) students who had given correct answers 107 (31.84%) students had given correct reasoning while 229 (68.16%) students had given incorrect reasoning. Out of 107 students who had given correct reasoning 45 (42.06%) students considered books as their primary source of knowledge followed by teachers-49 (45.79%), peers-5 (4.67%), parents-4 (3.74%) and observation/experience-4 (3.74%). Out of 229 (68.16%) students who had given incorrect reasoning 117 (51.09%) students considered books as their primary source of knowledge followed by teachers-101 (44.10%), peers-6 (2.62%), parents-2 (0.87%) and observation/experience-3 (1.31%).

While out of 926 students 590 students had given incorrect answers. Out of 590 (63.70 %) students who had given incorrect answers 53 (8.98%) students had given correct reasoning while 537 (91.02%) students had given incorrect reasoning. Out of 53 (8.98 %) students who had given correct reasoning, 26 (49.06%) students considered books as their primary source of knowledge followed by teachers-21 (39.62%), peers-2 (3.77%), parents-1 (1.89%) and observation/experience-3 (5.66%). Out of 537students who had given incorrect reasoning, 299 (55.68%) students considered books as their primary source of knowledge followed by teachers-207 (38.55%), peers-10 (1.89%), parents-6 (1.12%) and observation/experience-15 (2.79%).

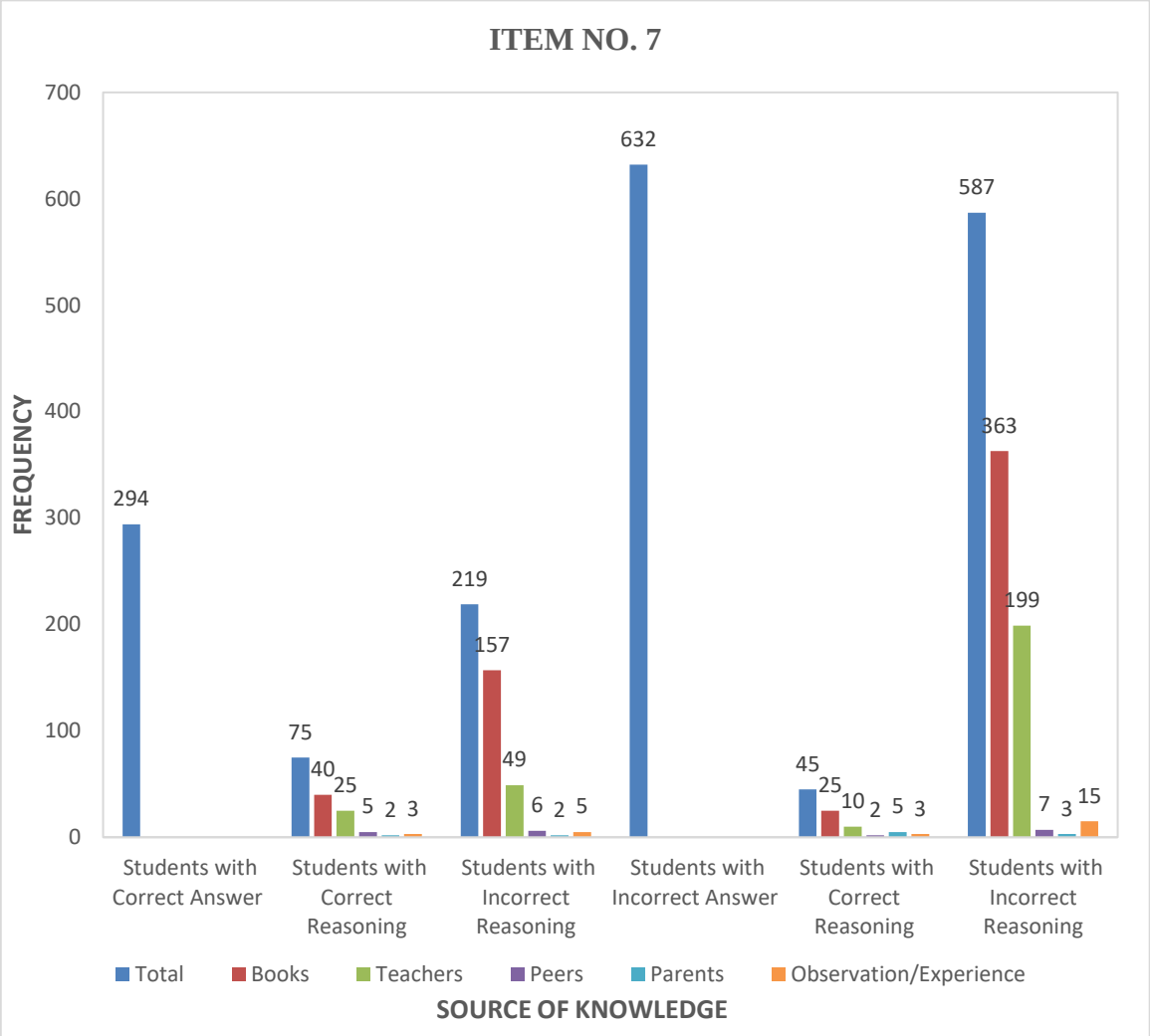
Out of 926 students 487 (52.59%) students considered books as their primary source of knowledge followed by teachers 378 (40.82%), peers 23 (2.48%), parents 13 (1.40%) and observations/experiences 25 (2.69%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 107 (11.55%) students had complete understanding of concept, 282 (30.45%) students had partial understanding of concept and 537 (58.00%) students had complete misunderstanding of concept or misconception.

Table_4.11 Student's Reasons and Source of Knowledge (Physics)

Item No. 7	It is very difficult to push a heavy box in the same direction by you and your friend.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	294(31.70)	75(25.51)	219(74.49)	632(68.30)	45(7.12)	587(92.88)
Source of Knowledge						
Books		40(53.33)	157(71.69)		25(55.56)	363(61.84)
Teachers		25(33.33)	49(22.37)		10(22.22)	199(33.90)
Peers		5(6.67)	6(2.74)		2(4.44)	7(1.19)
Parents		2(2.67)	2(0.91)		5(11.11)	3(0.51)
Observation /Experience		3(4.00)	5(2.28)		3(6.67)	15(2.56)

Graph_4.11 Graphical Representation of Table 4.11



From table and graph 4.11 it is evident that regarding item No. 7 out of 926 students 294 (31.70%) students had given correct answers. Out of 294 (31.70%) students who had given correct answers 75 (25.51%) students had given correct reasoning while 219 (74.49%) students had given incorrect reasoning. Out of 75 (25.51%) students who had given correct reasoning 40 (53.33%) students considered books as their primary source of knowledge followed by teachers-25 (33.33%), peers-5 (6.67%), parents-2 (2.67%) and observation/experience-3 (4%). Out of 219 (74.49%) students who had given incorrect reasoning 157 (71.69%) students considered books as their primary source of knowledge followed by teachers-49 (22.37%), peers-6 (2.74%), parents-2 (0.91%) and observation/experience-5 (2.28%).

While out of 926 students 632 (68.30%) students had given incorrect answers. Out of 632 (68.30%) students who had given incorrect answers 45 (7.12%) students had given correct reasoning while 587 (92.88%) students had given incorrect reasoning. Out of 45 students who had given correct reasoning, 25 (55.56%) students considered books as their primary source of knowledge followed by teachers-10 (22.22%), peers-2 (4.44%), parents-5 (11.11%) and observation/experience-3 (6.67%). Out of 587 (92.88%) students who had given incorrect reasoning, 363 (61.84%) students considered books as their primary source of knowledge followed by teachers-199 (33.90 %), peers-7 (1.19 %), parents-3 (0.51%) and observation/experience-15 (2.56%).

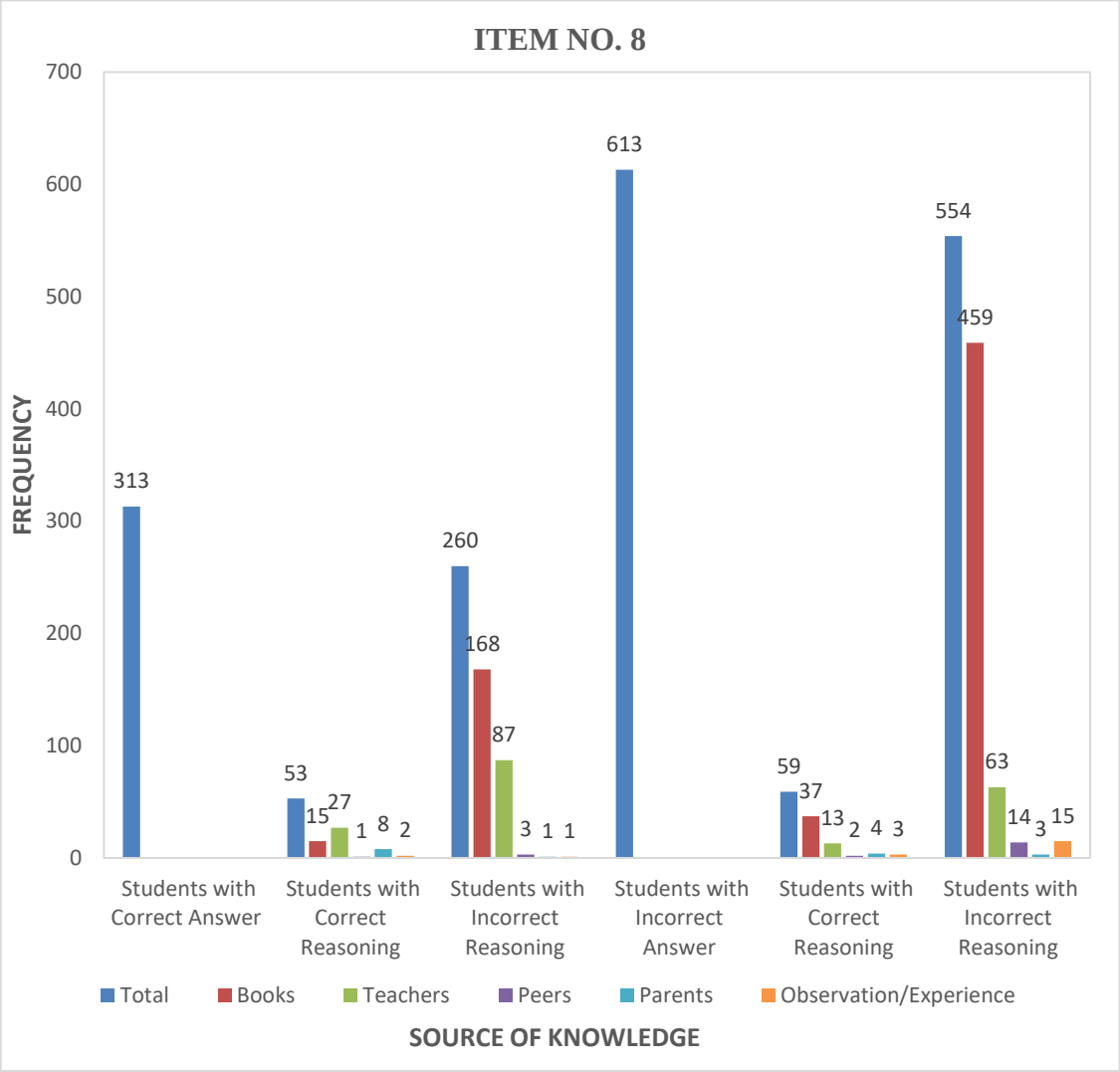
Out of 926 students 585 (63.17%) students considered books as their primary source of knowledge followed by teachers 283 (30.56%), peers 20 (2.15%), parents 12 (1.29%) and observations/experiences 26 (2.80%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 75 (25.51%) students had complete understanding of concept, 264 (28.51%) students had partial understanding of concept and 587 (63.39%) students had complete misunderstanding of concept or misconception.

Table_4.12 Student's Reasons and Source of Knowledge (Physics)

Item No. 8	**We are able to take injections from syringe because of atmospheric pressure.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & % of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**313(33.80)**	**53(16.93)**	**260(83.07)**	**613(66.20)**	**59(9.62)**	**554(90.38)**
Source of Knowledge						
Books		**15(28.30)**	**168(64.63)**		**37(62.71)**	**459(82.85)**
Teachers		**27(50.94)**	**87(33.46)**		**13(22.03)**	**63(11.37)**
Peers		**1(1.89)**	**3(1.15)**		**2(3.39)**	**14(2.53)**
Parents		**8(15.09)**	**1(0.38)**		**4(6.78)**	**3(0.54)**
Observation /Experience		**2(3.78)**	**1(0.38)**		**3(5.09)**	**15(2.71)**

Graph_4.12 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.12 it is evident that regarding item No. 8 out of 926 students 313 (33.80%) students had given correct answers. Out of 313 (33.80%) students who had given correct answers 53 (16.93%) students had given correct reasoning while 260 (83.07%) students had given incorrect reasoning. Out of 53 (16.93%) students who had given correct reasoning 15 (28.30%) students considered books as their primary source of knowledge followed by teachers-27 (50.94%), peers-1 (1.89%), parents-8 (15.09%) and observation/experience-2 (3.78%). Out of 260 students who had given incorrect reasoning 168 (64.63%) students considered books as their primary source of knowledge followed by teachers-87 (33.46%), peers-3 (1.15%), parents-1 (0.38%) and observation/experience-1 (0.38%).

While out of 926 students 613 (66.20%) students had given incorrect answers. Out of 613 (66.20%) students who had given incorrect answers 59 (9.62%) students had given correct reasoning while 554 (90.38%) students had given incorrect reasoning. Out of 59 (9.62%) students who had given correct reasoning, 37 (62.91%) students considered books as their primary source of knowledge followed by teachers-13 (22.03%), peers-2 (3.39%), parents-4 (6.78%) and observation/experience-3 (5.09%). Out of 554 students who had given incorrect reasoning, 459 (82.85%) students considered books as their primary source of knowledge followed by teachers-63 (11.37%), peers-14 (2.53%), parents-3 (0.54%) and observation/experience-15 (2.71%).

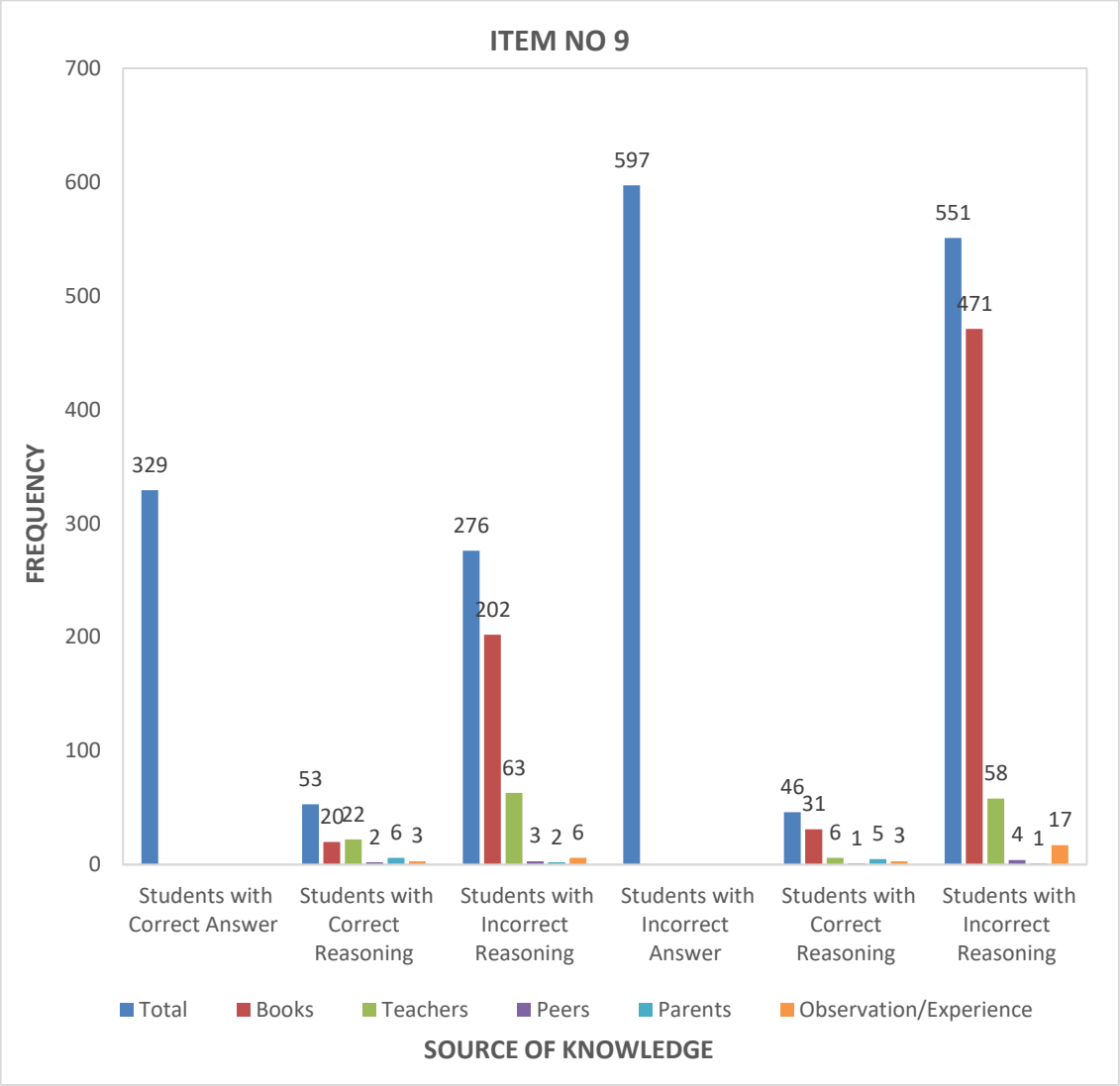
Out of 926 students 679 (73.32%) students considered books as their primary source of knowledge followed by teachers 190 (20.51%), peers 20 (2.15%), parents 16 (1.72%) and observations/experiences 21 (2.26%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 53 (5.73%) students had complete understanding of concept, 319 (34.44%) students had partial understanding of concept and 554 (59.83%) students had complete misunderstanding of concept or misconception.

Table_4.13 Student's Reasons and Source of Knowledge (Physics)

Item No. 9	**The liquid pressure decreases with increase in depth.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & (%) of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**329(35.50)**	**53(16.11)**	**276(83.89)**	**597(66.20)**	**46(7.70)**	**551(92.30)**
Source of Knowledge						
Books		**20(37.74)**	**202(73.19)**		**31(67.39)**	**471(85.48)**
Teachers		**22(41.51)**	**63(22.83)**		**6(13.04)**	**58(10.53)**
Peers		**2(3.77)**	**3(1.09)**		**1(2.17)**	**4(0.73)**
Parents		**6(11.32)**	**2(0.72)**		**5(10.87)**	**1(0.18)**
Observation /Experience		**3(5.66)**	**6(2.17)**		**3(6.25)**	**17(3.09)**

Graph_4.13 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.13 it is evident that regarding item No. 9 out of 926 students 329 (35.50 %) students had given correct answers. Out of 329 (35.50%) students who had given correct answers 53 (16.11%) students had given correct reasoning while 276 (83.89 %) students had given incorrect reasoning. Out of 53 (16.11%) students who had given correct reasoning 20 (37.74%) students considered books as their primary source of knowledge followed by teachers-22 (41.51%), peers-2 (3.77%), parents-6 (11.32%) and observation/experience-3 (5.66%). Out of 276 (83.89%) students who had given incorrect reasoning 202 (73.19%) students considered books as their primary source of knowledge followed by teachers-63 (22.83%), peers-3 (1.09%), parents-2 (0.72%) and observation/experience-6 (2.17%).

While out of 926 students 597 (66.20%) students had given incorrect answers. Out of 597 (66.20%) students who had given incorrect answers 46 (7.70%) students had given correct reasoning while 551 (92.30%) students had given incorrect reasoning. Out of 46 (7.70%) students who had given correct reasoning, 31 (67.39%) students considered books as their primary source of knowledge followed by teachers-6 (13.04%), peers-1 (2.17%), parents-5 (10.87%) and observation/experience-3 (6.25%). Out of 551 (92.30 %) students who had given incorrect reasoning, 471 (85.48%) students considered books as their primary source of knowledge followed by teachers-58 (10.53%), peers-4 (0.73%), parents-1 (0.18%) and observation/experience-17 (3.09%).

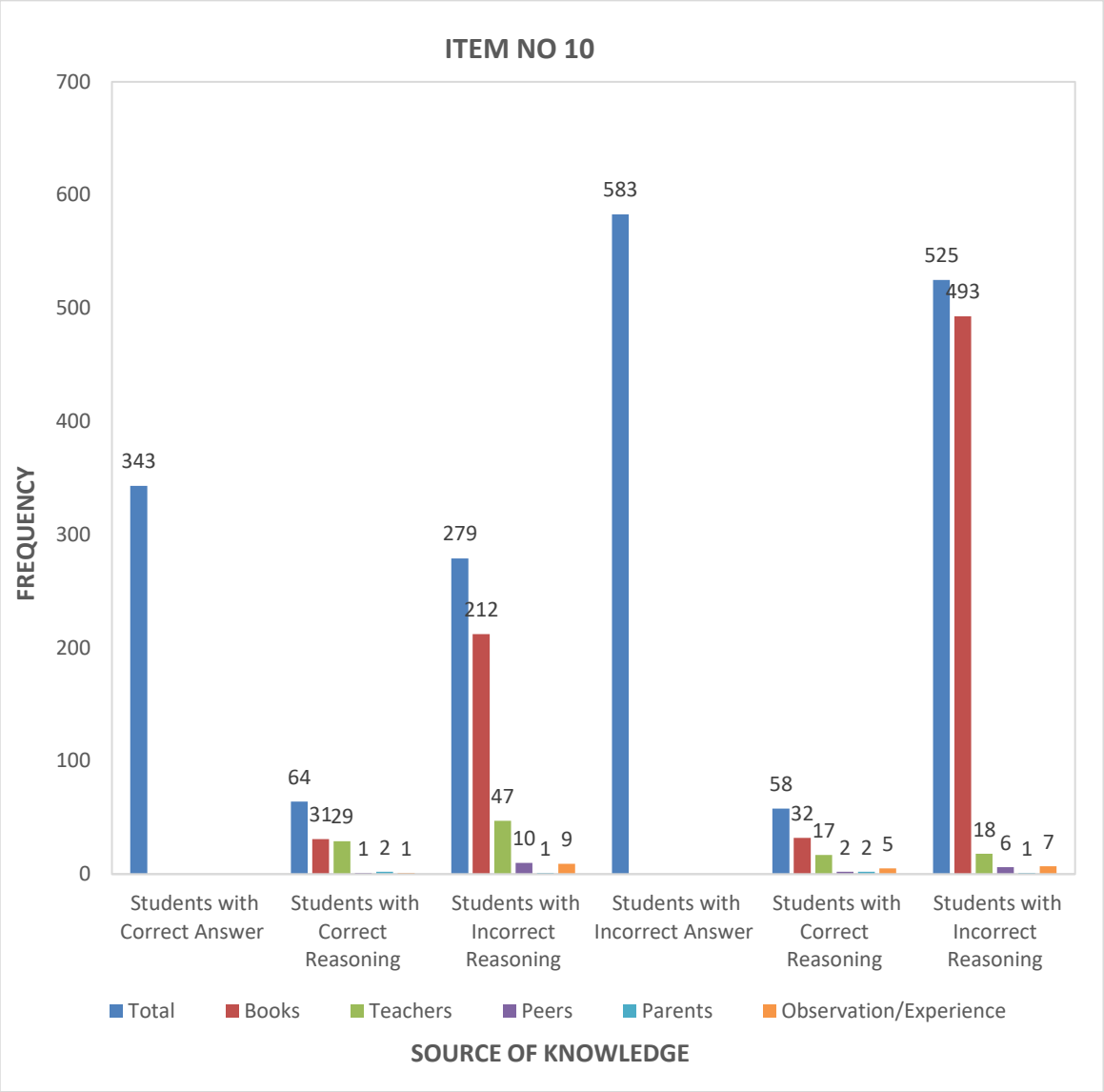
Out of 926 students 724 (78.18%) students considered books as their primary source of knowledge followed by teachers 149 (16.09 %), peers 10 (1.07%), parents 14 (1.51%) and observations/experiences 29 (3.13%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 53 (5.72%) students had complete understanding of concept, 322 (34.77%) students had partial understanding of concept and 554 (59.51%) students had complete misunderstanding of concept or misconception.

Table_4.14 Student's Reasons and Source of Knowledge (Physics)

Item No. 10	Magnetic force is always repulsive in nature.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	343(37.00)	64(18.65)	279(81.35)	583(63.00)	58(9.94)	525(90.06)
Source of Knowledge						
Books		31(48.44)	212(75.99)		32(55.17)	493(93.90)
Teachers		29(45.31)	47(16.85)		17(29.31)	18(3.43)
Peers		1(1.56)	10(3.58)		2(3.45)	6(1.14)
Parents		2(3.13)	1(0.36)		2(3.45)	1(0.19)
Observation /Experience		1(1.56)	9(3.23)		5(8.62)	7(1.33)

Graph_4.14 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.14 it is evident that regarding item No. 10 out of 926 students 343 (37.00 %) students had given correct answers. Out of 343 (37.00 %) students who had given correct answers 64 (18.65 %) students had given correct reasoning while 279 (81.35 %) students had given incorrect reasoning. Out of 64 (18.65 %) students who had given correct reasoning 31(48.44 %) students considered books as their primary source of knowledge followed by teachers-29 (45.31 %), peers-1 (1.56 %), parents-2 (3.13 %) and observation/experience-1 (1.56 %). Out of 279 (81.35 %) students who had given incorrect reasoning 212 (75.99 %) students considered books as their primary source of knowledge followed by teachers-47 (16.85 %), peers-10 (3.58 %), parents-1 (0.36 %) and observation/experience-9 (3.23 %).

While out of 926 students 583 (63.00%) students had given incorrect answers. Out of 583 (63.00%) students who had given incorrect answers 58 (9.94%) students had given correct reasoning while 525 (90.06 %) students had given incorrect reasoning. Out of 58 (9.94%) students who had given correct reasoning, 32 (55.17%) students considered books as their primary source of knowledge followed by teachers-17 (29.31 %), peers-2 (3.45%), parents-2 (3.45%) and observation/experience-5 (8.62%). Out of 525 (90.06 %) students who had given incorrect reasoning, 493 (93.90%) students considered books as their primary source of knowledge followed by teachers-18 (3.43%), peers-6 (1.14%), parents-1(0.19%) and observation/experience-7 (1.33%).

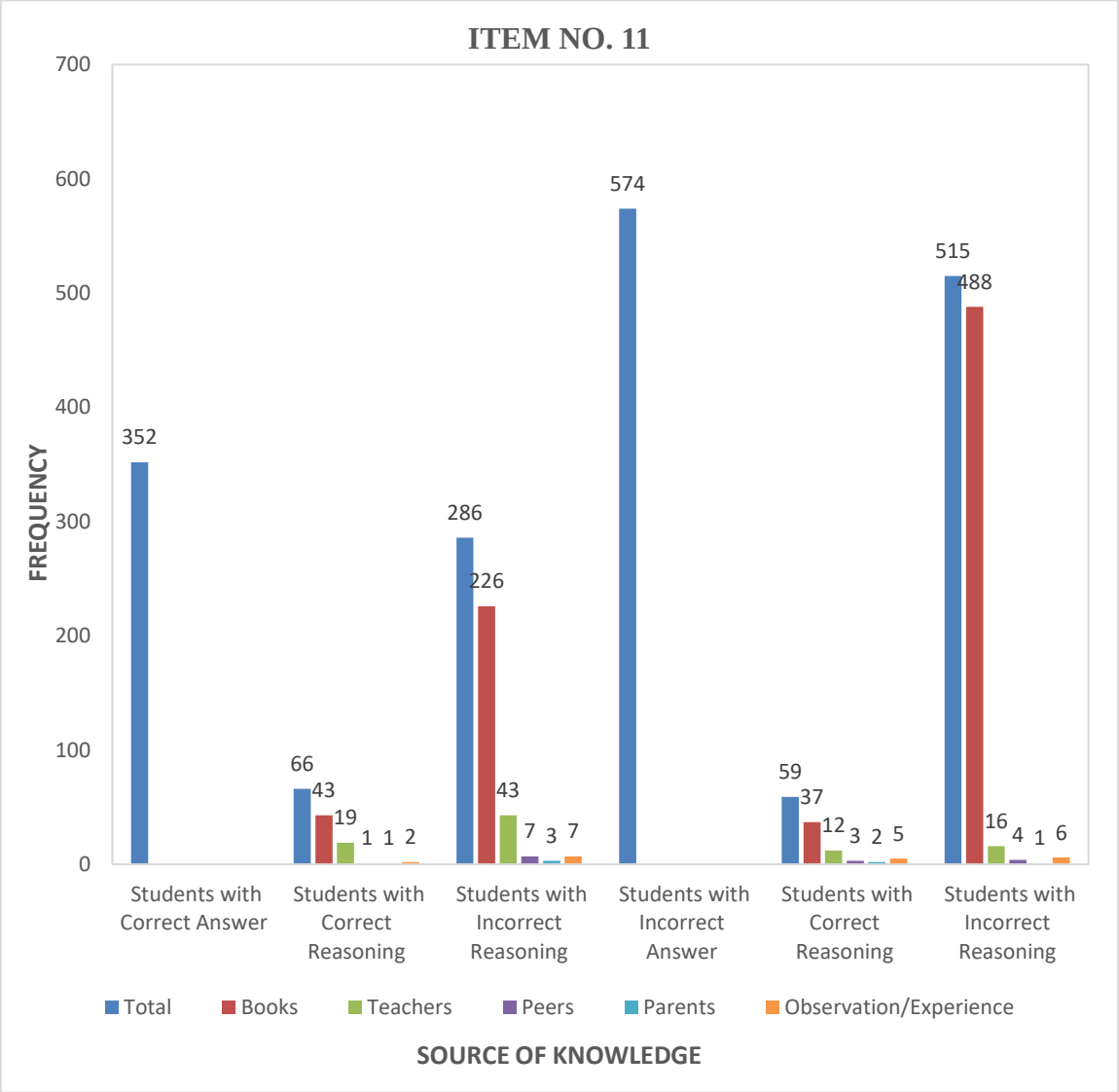
Out of 926 students 606 (65.44%) students considered books as their primary source of knowledge followed by teachers 261 (28.18%), peers 16 (1.72%), parents 13 (1.40%) and observations/experiences 30 (3.23%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 64 (6.91%) students had complete understanding of concept, 337 (36.39%) students had partial understanding of concept and 525 (56.70%) students had complete misunderstanding of concept or misconception.

Table_4.15 Student's Reasons and Source of Knowledge (Physics)

Item No. 11	Charged particles at rest experience no force.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	352(38.00)	66(18.75)	286(81.25)	574(62.00)	59(10.27)	515(89.73)
Source of Knowledge						
Books		43(65.15)	226(79.02)		37(62.71)	488(94.76)
Teachers		19(28.79)	43(15.03)		12(20.34)	16(3.11)
Peers		1(1.52)	7(2.15)		3(5.08)	4(0.78)
Parents		1(1.52)	3(1.05)		2(3.39)	1(0.19)
Observation /Experience		2(3.03)	7(2.45)		5(8.47)	6(1.17)

Graph_4.15 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.15 it is evident that regarding item No. 11 out of 926 students 352 (38.00 %) students had given correct answers. Out of 352 (38.00%) students who had given correct answers 66 (18.75%) students had given correct reasoning while 286 (81.25%) students had given incorrect reasoning. Out of 66 (18.75%) students who had given correct reasoning 43 (65.15 %) students considered books as their primary source of knowledge followed by teachers-19 (28.79%), peers-1 (1.52%), parents-1 (1.52%) and observation/experience-2 (3.03%). Out of 286 (81.25%) students who had given incorrect reasoning 226 (79.02%) students considered books as their primary source of knowledge followed by teachers-43 (15.03 %), peers-7(2.15%), parents-3 (1.05%) and observation/experience-7 (2.45%).

While out of 926 students 574 (62.00%) students had given incorrect answers. Out of 574 (62.00 %) students who had given incorrect answers 59 (10.27%) students had given correct reasoning while 515(89.73%) students had given incorrect reasoning. Out of 59 students who had given correct reasoning, 37 (62.71%) students considered books as their primary source of knowledge followed by teachers-12 (20.34%), peers-3 (5.08 %), parents-2 (3.39%) and observation/experience-5 (8.47%). Out of 515 (89.73%) students who had given incorrect reasoning, 488 (94.76%) students considered books as their primary source of knowledge followed by teachers-16 (3.11%), peers-4 (0.78%), parents-1 (0.19%) and observation/experience-6 (1.17%).

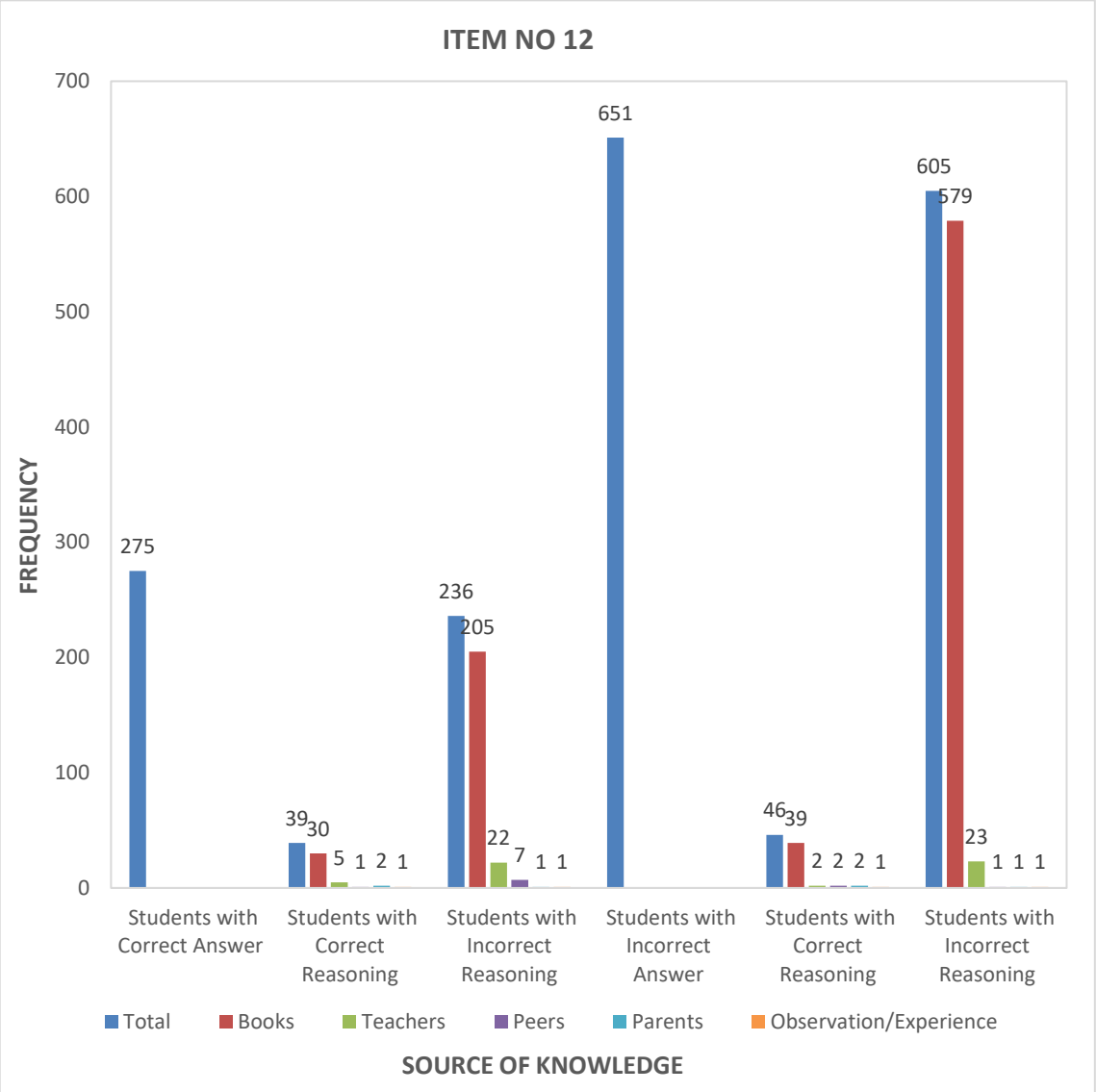
Out of 926 students 794 (85.74%) students considered books as their primary source of knowledge followed by teachers 90 (9.71%), peers 15 (1.61%), parents 7 (0.75%) and observations/experiences 20 (2.15%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 66 (7.13%) students had complete understanding of concept, 345 (37.26%) students had partial understanding of concept and 515 (55.61%) students had complete misunderstanding of concept or misconception.

Table_4.16 Student's Reasons and Source of Knowledge (Physics)

Item No. 12	An apple can be easily cut with a sharp knife than a blunt knife.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	275(29.70)	39(14.18)	236(85.82)	651(70.30)	46(7.06)	605(92.94)
Source of Knowledge						
Books		30(76.92)	205(86.86)		39(84.78)	579(95.70)
Teachers		5(12.82)	22(9.32)		2(4.35)	23(3.80)
Peers		1(2.56)	7(2.97)		2(4.35)	1(0.17)
Parents		2(5.13)	1(0.42)		2(4.35)	1(0.17)
Observation /Experience		1(2.56)	1(0.42)		1(2.17)	1(0.17)

Graph_4.16 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.16 it is evident that regarding item No. 12 out of 926 students 275 (29.70 %) students had given correct answers. Out of 275 (29.70%) students who had given correct answers 39 (14.18%) students had given correct reasoning while 236 (85.82%) students had given incorrect reasoning. Out of 39 (14.18%) students who had given correct reasoning 30 (76.92%) students considered books as their primary source of knowledge followed by teachers-5 (12.82%), peers-1 (2.56%), parents-2 (5.13%) and observation/experience-1 (2.56%). Out of 236 (85.82%) students who had given incorrect reasoning 205 (86.86%) students considered books as their primary source of knowledge followed by teachers-22 (9.32%), peers-7 (2.97%), parents-1(0.42%) and observation/experience-1 (0.42%).

While out of 926 students 651 (70.30%) students had given incorrect answers. Out of 651 (70.30%) students who had given incorrect answers 46 (7.06%) students had given correct reasoning while 605 students had given incorrect reasoning. Out of 46 students who had given correct reasoning, 39 (84.78%) students considered books as their primary source of knowledge followed by teachers-2 (4.35%), peers-2 (4.35%), parents-2 (4.35%) and observation/experience-1 (2.17%). Out of 605 (92.94%) students who had given incorrect reasoning, 579 (95.70%) students considered books as their primary source of knowledge followed by teachers-23 (3.80%), peers-1 (0.17%), parents-1 (0.17 %) and observation/experience-1 (0.17%).

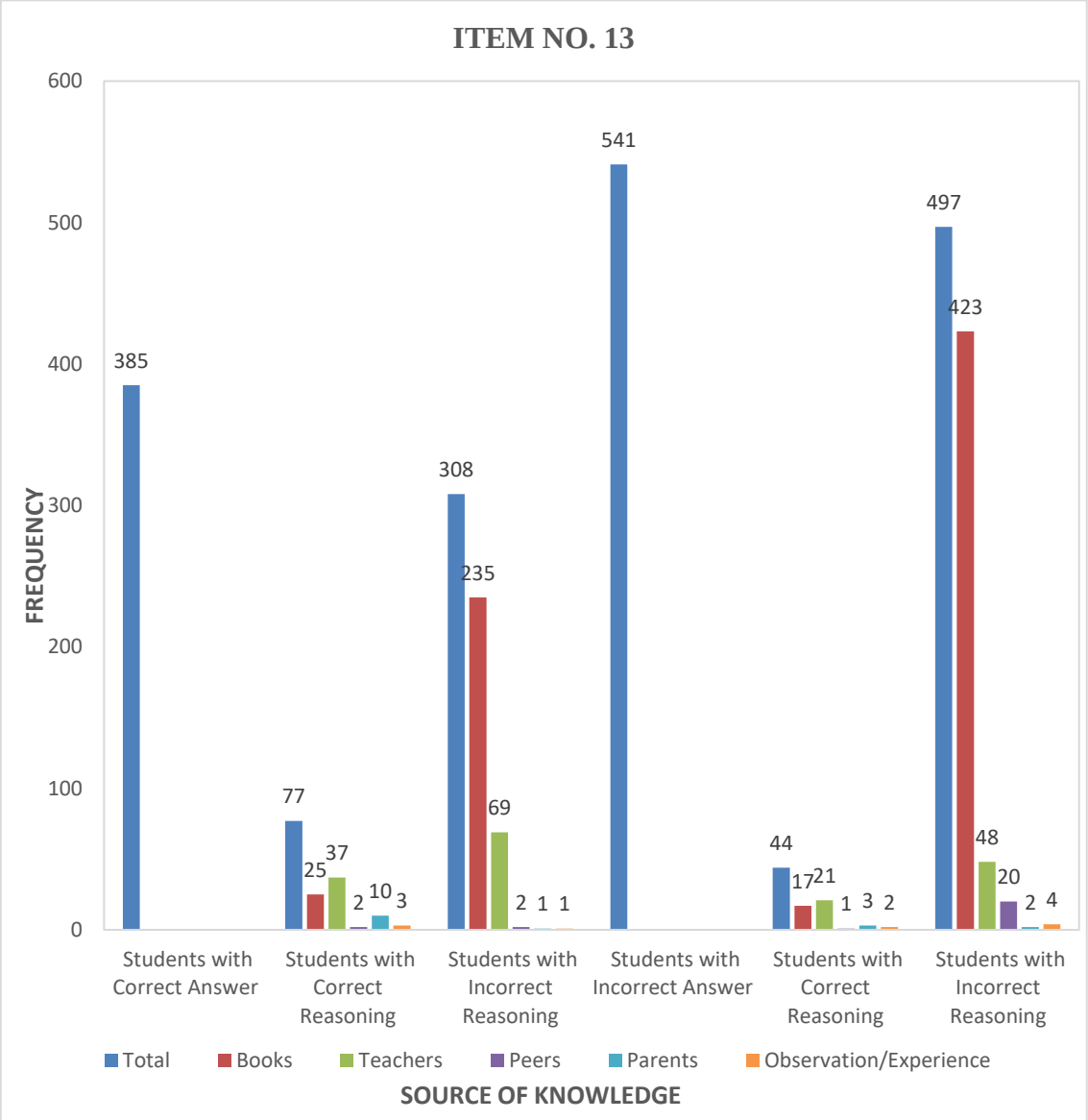
Out of 926 students 853 (92.11 %) students considered books as their primary source of knowledge followed by teachers 52 (5.61%), peers 11 (1.18 %), parents 6 (0.64%) and observations/experiences 4 (0.43 %). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 39 (4.21%) students had complete understanding of concept, 282 (30.45 %) students had partial understanding of concept and 605 (65.34%) students had complete misunderstanding of concept or misconception.

Table_4.17 Student's Reasons and Source of Knowledge (Physics)

Item No. 13	Bicycle tyres wear out due to high muscular force.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	385(41.60)	77(20.00)	308(80.00)	541(58.40)	44(8.14)	497(91.86)
Source of Knowledge						
Books		25(32.47)	235(76.30)		17(38.64)	423(85.11)
Teachers		37(48.05)	69(22.40)		21(47.73)	48(9.66)
Peers		2(2.60)	2(0.65)		1(2.27)	20(4.02)
Parents		10(12.99)	1(0.32)		3(6.82)	2(0.40)
Observation /Experience		3(3.90)	1(0.32)		2(4.55)	4(0.80)

Graph_4.17 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.17 it is evident that regarding item No. 13 out of 926 students 385 (41.60%) students had given correct answers. Out of 385 (41.60%) students who had given correct answers 77 (20%) students had given correct reasoning while 308 (80 %) students had given incorrect reasoning. Out of 77 (20%) students who had given correct reasoning 25 (32.47%) students considered books as their primary source of knowledge followed by teachers-37 (48.05%), peers-2 (2.60%), parents-10 (12.99%) and observation/experience-3 (3.90%). Out of 308 (80%) students who had given incorrect reasoning 235 (76.30%) students considered books as their primary source of knowledge followed by teachers-69 (22.40%), peers-2 (0.65%), parents-1 (0.32%) and observation/experience-1 (0.32%).

While out of 926 students 541 (58.40%) students had given incorrect answers. Out of 541 (58.40%) students who had given incorrect answers 44 (8.14%) students had given correct reasoning while 497 (91.86%) students had given incorrect reasoning. Out of 44 (8.14%) students who had given correct reasoning, 17 (38.64%) students considered books as their primary source of knowledge followed by teachers-21 (47.73%), peers-1 (2.27%), parents-3 (6.82%) and observation/experience 2 (4.55%). Out of 497 (91.86 %) students who had given incorrect reasoning, 423 (85.11%) students considered books as their primary source of knowledge followed by teachers-48 (9.66%), peers-20 (4.02%), parents-2 (0.40%) and observation/experience-4 (0.80%).

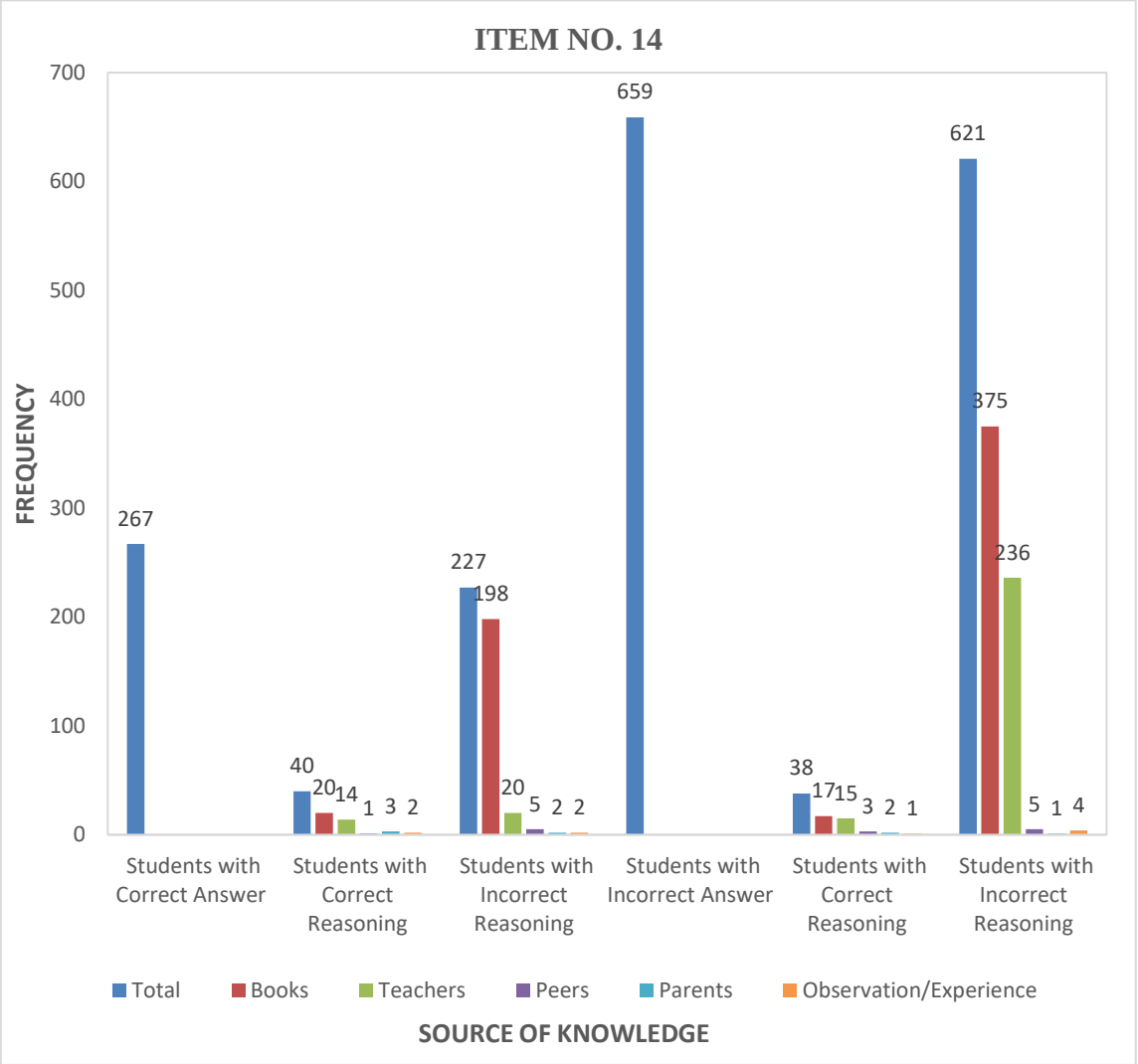
Out of 926 students 700 (75.59%) students considered books as their primary source of knowledge followed by teachers 175 (18.89%), peers 25 (2.69%), parents 16 (1.72%) and observations/experiences 10 (1.07%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 77 (8.31%) students had complete understanding of concept, 352 (38.01%) students had partial understanding of concept and 497 (53.68%) students had complete misunderstanding of concept or misconception.

Table_4.18 Student's Reasons and Source of Knowledge (Physics)

Item No. 14	Water leaks at equal rate when four holes of same size and at same level were made in two vessels of different shape and size.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	267(28.80)	40(14.99)	227(85.01)	659(71.20)	38(5.76)	621(94.24)
Source of Knowledge						
Books		20(50.00)	198(87.22)		17(44.74)	375(60.39)
Teachers		14(35.00)	20(8.81)		15(39.47)	236(38.00)
Peers		1(2.50)	5(2.20)		3(7.89)	5(0.81)
Parents		3(7.50)	2(0.88)		2(5.26)	1(0.16)
Observation /Experience		2(5.00)	2(0.88)		1(2.63)	4(0.64)

Graph_4.18 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.18 it is evident that regarding item No. 14 out of 926 students 267(28.80%) students had given correct answers. Out of 267 (28.80%) students who had given correct answers 40 (14.99%) students had given correct reasoning while 227 (85.01%) students had given incorrect reasoning. Out of 40 (14.99%) students who had given correct reasoning 20 (50%) students considered books as their primary source of knowledge followed by teachers-14 (35.00%), peers-1 (2.50%), parents-3 (7.50%) and observation/experience-2 (5.00%). Out of 227 (85.01 %) students who had given incorrect reasoning 198 (87.22%) students considered books as their primary source of knowledge followed by teachers-20 (8.81%), peers-5 (2.20%), parents-2 (0.88%) and observation/experience-2 (0.88%).

While out of 926 students 659 (71.20%) students had given incorrect answers. Out of 659 (71.20%) students who had given incorrect answers 38 (5.76%) students had given correct reasoning while 621 (94.24%) students had given incorrect reasoning. Out of 38 (5.76%) students who had given correct reasoning, 17 (44.74%) students considered books as their primary source of knowledge followed by teachers-15 (39.47%), peers-3 (7.89%), parents-2 (5.26%) and observation/experience 1 (2.63%). Out of 621 (94.24 %) students who had given incorrect reasoning, 375 (60.39%) students considered books as their primary source of knowledge followed by teachers-236 (38%), peers-5 (0.81%), parents-1 (0.16%) and observation/experience-4 (0.64%).

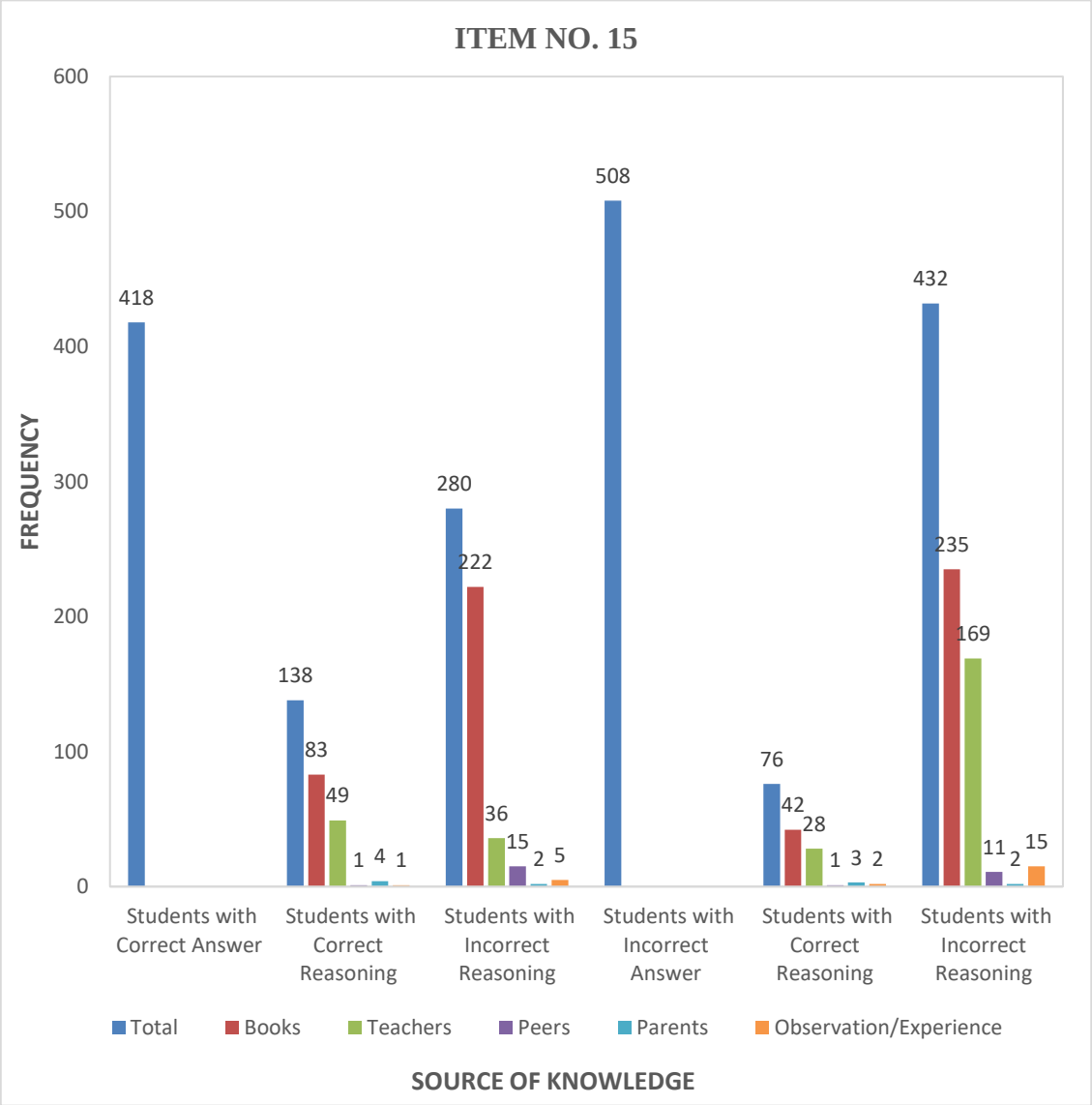
Out of 926 students 610 (65.87%) students considered books as their primary source of knowledge followed by teachers 285 (30.77%), peers 14 (1.51%), parents 8 (0.86%) and observations/experiences 9 (0.97%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 40 (4.32%) students had complete understanding of concept, 265 (28.62%) students had partial understanding of concept and 621 (67.06%) students had complete misunderstanding of concept or misconception.

Table_4.19 Student's Reasons and Source of Knowledge (Physics)

Item No. 15	A blunt nail penetrates the wall easily as compared to a sharp nail.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	418(45.10)	138(33.01)	280(66.99)	508(54.90)	76(14.96)	432(85.04)
Source of Knowledge						
Books		83(60.14)	222(79.29)		42(55.26)	235(54.40)
Teachers		49(35.51)	36(12.86)		28(36.84)	169(39.12)
Peers		1(0.72)	15(5.36)		1(1.32)	11(2.55)
Parents		4(2.90)	2(0.71)		3(3.95)	2(0.46)
Observation /Experience		1(0.72)	5(1.79)		2(2.63)	15(3.47)

Graph_4.19 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.19 it is evident that regarding item No. 15 out of 926 students 418 (45.10 %) students had given correct answers. Out of 418 (45.10%) students who had given correct answers 138 (33.01%) students had given correct reasoning while 280 (66.99%) students had given incorrect reasoning. Out of 138 (33.01%) students who had given correct reasoning 83 (60.14%) students considered books as their primary source of knowledge followed by teachers-49 (35.51%), peers-1 (0.72%), parents-4 (2.90%) and observation/experience-1 (0.72%). Out of 280 (66.99%) students who had given incorrect reasoning 222 (79.29%) students considered books as their primary source of knowledge followed by teachers-36 (12.86%), peers-15 (5.36%), parents-2 (0.71%) and observation/experience-5 (1.79%).

While out of 926 students 508 (54.90%) students had given incorrect answers. Out of 508 (54.90%) students who had given incorrect answers 76 (14.96%) students had given correct reasoning while 432 (85.04%) students had given incorrect reasoning. Out of 76 (14.96 %) students who had given correct reasoning, 42 (55.26%) students considered books as their primary source of knowledge followed by teachers-28 (36.84%), peers-1 (1.32%), parents-3 (3.95%) and observation/experience 2 (2.63%). Out of 432 (85.04 %) students who had given incorrect reasoning, 235 (54.40%) students considered books as their primary source of knowledge followed by teachers-169 (39.12%), peers-11 (2.55%), parents-2 (0.46%) and observation/experience-15 (3.47%).

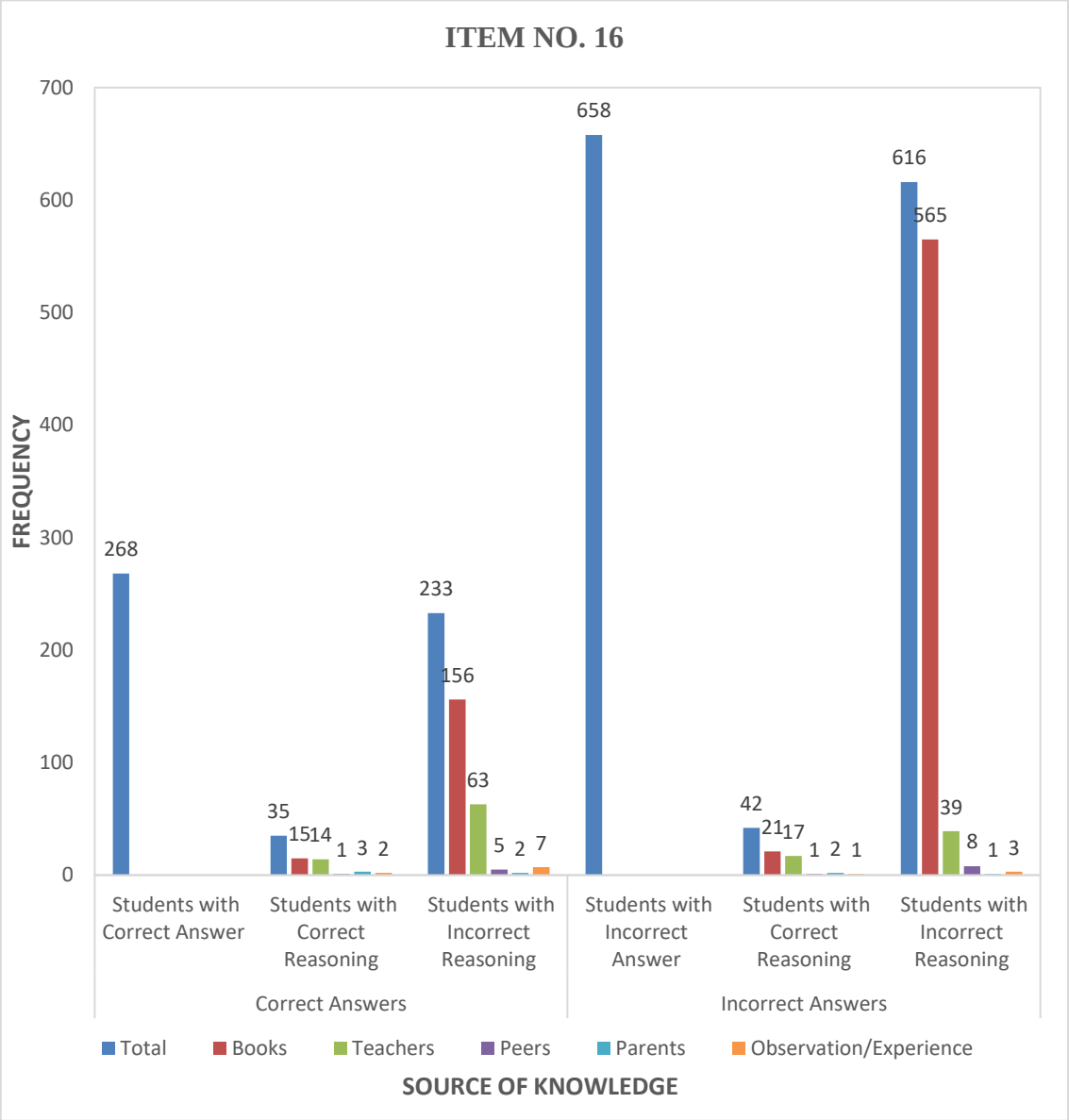
Out of 926 students 582 (62.85%) students considered books as their primary source of knowledge followed by teachers 282 (30.45%), peers 28 (3.02%), parents 11 (1.18%) and observations/experiences 23 (2.48%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 138 (14.90%) students had complete understanding of concept, 356 (38.44%) students had partial understanding of concept and 432 (46.66%) students had complete misunderstanding of concept or misconception.

Table_4.20 Student's Reasons and Source of Knowledge (Physics)

Item No. 16	Frictional force is responsible for raindrops falling downwards.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	268(28.90)	35(13.05)	233(86.95)	658(71.10)	42(6.38)	616(93.62)
Source of Knowledge						
Books		15(42.86)	156(66.95)		21(50.00)	565(91.72)
Teachers		14(40.00)	63(27.04)		17(40.48)	39(6.33)
Peers		1(2.86)	5(2.15)		1(2.38)	8(1.30)
Parents		3(8.57)	2(0.86)		2(4.76)	1(0.16)
Observation /Experience		2(5.71)	7(3.00)		1(2.38)	3(0.49)

Graph_4.20 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.20 it is evident that regarding item No. 16 out of 926 students 268 (28.90%) students had given correct answers. Out of 268 (28.90%) students who had given correct answers 35 (13.05%) students had given correct reasoning while 233 (86.95%) students had given incorrect reasoning. Out of 35 (13.05%) students who had given correct reasoning 15(42.86%) students considered books as their primary source of knowledge followed by teachers-14 (40%) peers-1 (2.86%), parents-3 (8.57%) and observation/experience-2 (5.71%). Out of 233 (86.95%) students who had given incorrect reasoning 156 (66.95%) students considered books as their primary source of knowledge followed by teachers-63 (27.04%), peers-5 (2.15%), parents-2 (0.86%) and observation/experience-7 (3.00%).

While out of 926 students 658 (71.10%) students had given incorrect answers. Out of 658 (71.10%) students who had given incorrect answers 42 (6.38%) students had given correct reasoning while 616 (93.92 %) students had given incorrect reasoning. Out of 42 (6.38%) students who had given correct reasoning, 21 (50%) students considered books as their primary source of knowledge followed by teachers-17 (40.48 %), peers-1 (2.38 %), parents-2 (4.76%) and observation/experience 1 (2.38%). Out of 616 (93.92%) students who had given incorrect reasoning, 565 (91.72%) students considered books as their primary source of knowledge followed by teachers-39 (6.33%), peers-8 (1.30%), parents-1 (0.16%) and observation/experience-3 (0.49%).

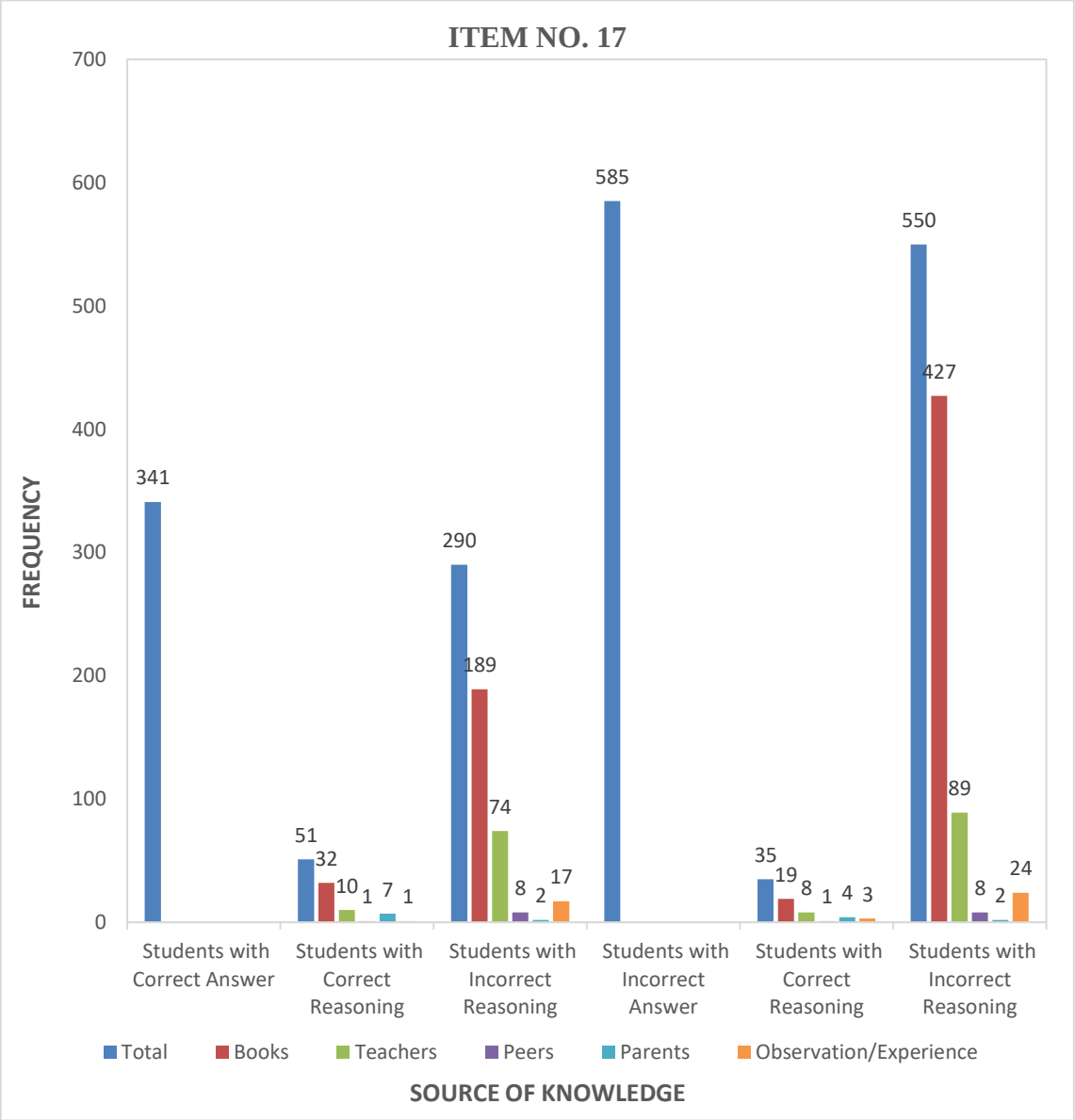
Out of 926 students 757 (61.01%) students considered books as their primary source of knowledge followed by teachers 133 (14.36 %), peers 15 (1.61%), parents 8 (0.86%) and observations/experiences 13 (1.40%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 35 (13.05%) students had complete understanding of concept, 275 (29.69%) students had partial understanding of concept and 616 (66.53%) students had complete misunderstanding of concept or misconception.

Table_4.21 Student's Reasons and Source of Knowledge (Physics)

Item No. 17	A water bottle kept on a bench leaks at equal rate when 4 holes were made at the same level.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	341(36.80)	51(14.95)	290(85.05)	585(63.20)	35(5.98)	550(94.02)
Source of Knowledge						
Books		32(62.75)	189(65.17)		19(54.29)	427(77.64)
Teachers		10(19.61)	74(25.52)		8(22.86)	89(16.18)
Peers		1(1.96)	8(2.76)		1(2.86)	8(1.45)
Parents		7(13.73)	2(0.69)		4(11.43)	2(0.36)
Observation /Experience		1(1.96)	17(5.86)		3(8.57)	24(4.36)

Graph_4.21 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.21 it is evident that regarding item No. 17 out of 926 students 341 (36.80%) students had given correct answers. Out of 341 (36.80%) students who had given correct answers 51 (14.95%) students had given correct reasoning while 290 (80.05%) students had given incorrect reasoning. Out of 51 (14.95%) students who had given correct reasoning 32 (62.75%) students considered books as their primary source of knowledge followed by teachers-10 (19.61%), peers-1 (1.96%), parents-7 (13.73%), and observation/experience-1 (1.96%). Out of 290 (80.05%) students who had given incorrect reasoning 189 (65.17 %) students considered books as their primary source of knowledge followed by teachers-74 (25.52%), peers-8 (2.76%), parents-2 (0.69%) and observation/experience-17 (5.86%).

While out of 926 students 585 (63.20%) students had given incorrect answers. Out of 585 (63.20%) students who had given incorrect answers 35 (5.98%) students had given correct reasoning while 550 (94.02%) students had given incorrect reasoning. Out of 35 (5.98%) students who had given correct reasoning, 19 (54.29%) students considered books as their primary source of knowledge followed by teachers-8 (22.86%), peers-1 (2.86%), parents-4 (11.43%) and observation/experience 3 (8.57%). Out of 550 (94.02 %) students who had given incorrect reasoning, 427 (77.64%) students considered books as their primary source of knowledge followed by teachers-89 (16.18%), peers-8 (1.45%), parents-2 (0.36%) and observation/experience-24 (4.36%).

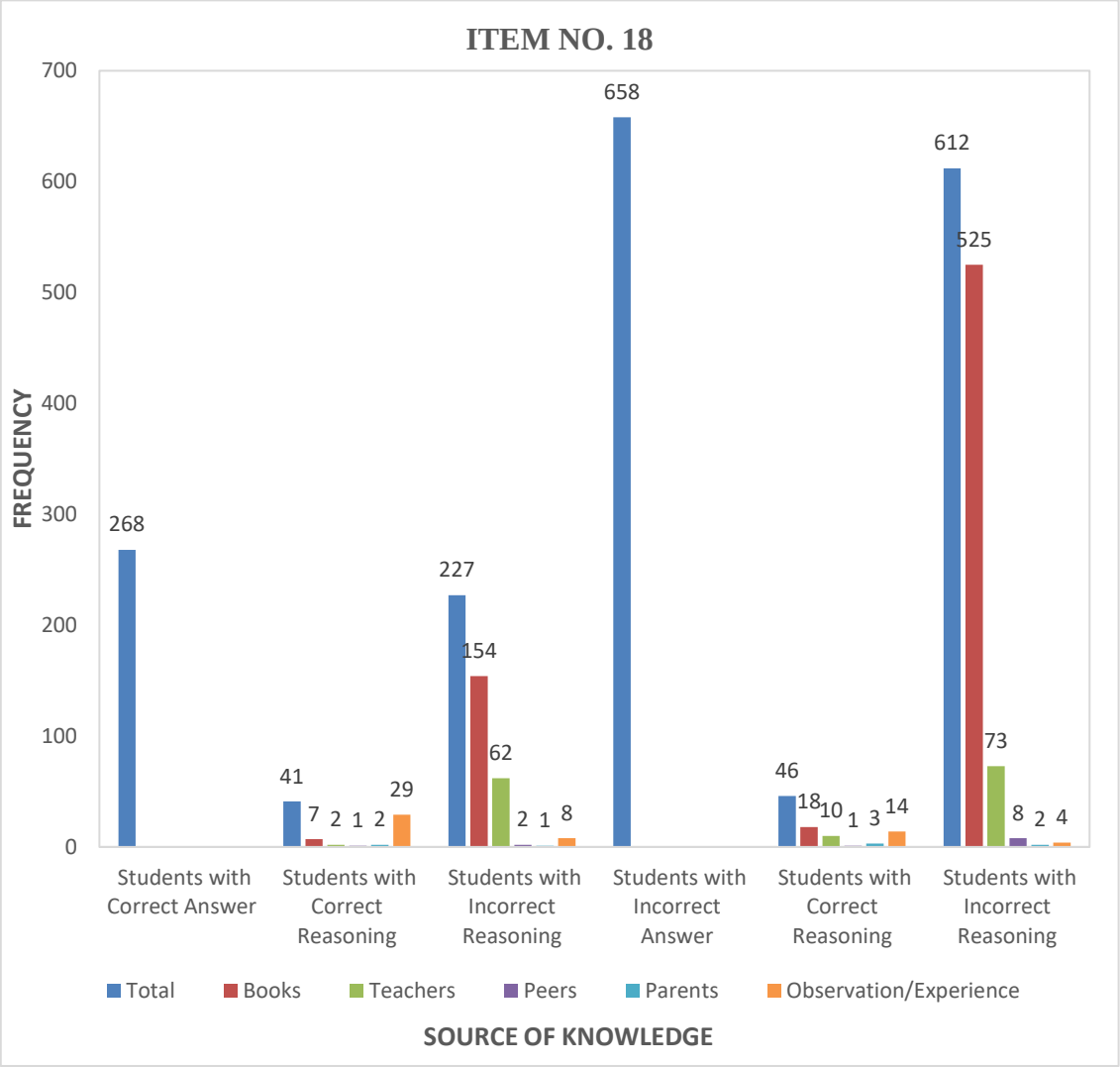
Out of 926 students 667 (72.03%) students considered books as their primary source of knowledge followed by teachers 181 (19.54%), peers 18 (1.94%), parents 15 (1.61%) and observations/experiences 45 (4.85%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 51 (5.50%) students had complete understanding of concept, 325 (35.10%) students had partial understanding of concept and 550 (59.40%) students had complete misunderstanding of concept or misconception.

Table_4.22 Student's Reasons and Source of Knowledge (Physics)

Item No. 18	The atmospheric pressure increases as we go above the surface.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	268(28.90)	41(15.30)	227(84.70)	658(71.10)	46(7.00)	612(93.00)
Source of Knowledge						
Books		7(17.07)	154(67.84)		18(39.19)	525(85.78)
Teachers		2(4.88)	62(27.31)		10(21.74)	73(11.93)
Peers		1(2.44)	2(0.88)		1(2.17)	8(1.31)
Parents		2(4.88)	1(0.44)		3(6.52)	2(0.33)
Observation /Experience		29(70.73)	8(3.52)		14(30.43)	4(4.65)

Graph_4.22 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.22 it is evident that regarding item No. 18 out of 926 students 268 (28.90 %) students had given correct answers. Out of 268 (28.90%) students who had given correct answers 41 (15.30%) students had given correct reasoning while 227 (84.70%) students had given incorrect reasoning. Out of 41 (15.30%) students who had given correct reasoning 7 (17.07%) students considered books as their primary source of knowledge followed by teachers-2 (4.88%) peers-1 (2.44%), parents-2 (4.88%) and observation/experience-29 (70.73%). Out of 227 (84.70%) students who had given incorrect reasoning 154 (67.84%) students considered books as their primary source of knowledge followed by teachers-62 (27.31%), peers-2 (0.88%), parents-1 (0.44%) and observation/experience-8 (3.52%).

While out of 926 students 658 (71.10%) students had given incorrect answers. Out of 658 (71.10%) students who had given incorrect answers 46 (7.00%) students had given correct reasoning while 612 (93.00%) students had given incorrect reasoning. Out of 46 (7%) students who had given correct reasoning, 18 (39.19%) students considered books as their primary source of knowledge followed by teachers-10 (21.74%), peers-1 (2.17 %), parents-3 (6.52%) and observation/experience 14 (30.43%). Out of 612 (93%) students who had given incorrect reasoning, 525 (85.78%) students considered books as their primary source of knowledge followed by teachers-73 (11.93%), peers-8 (1.31%), parents-2 (0.33%) and observation/experience-4 (4.65%).

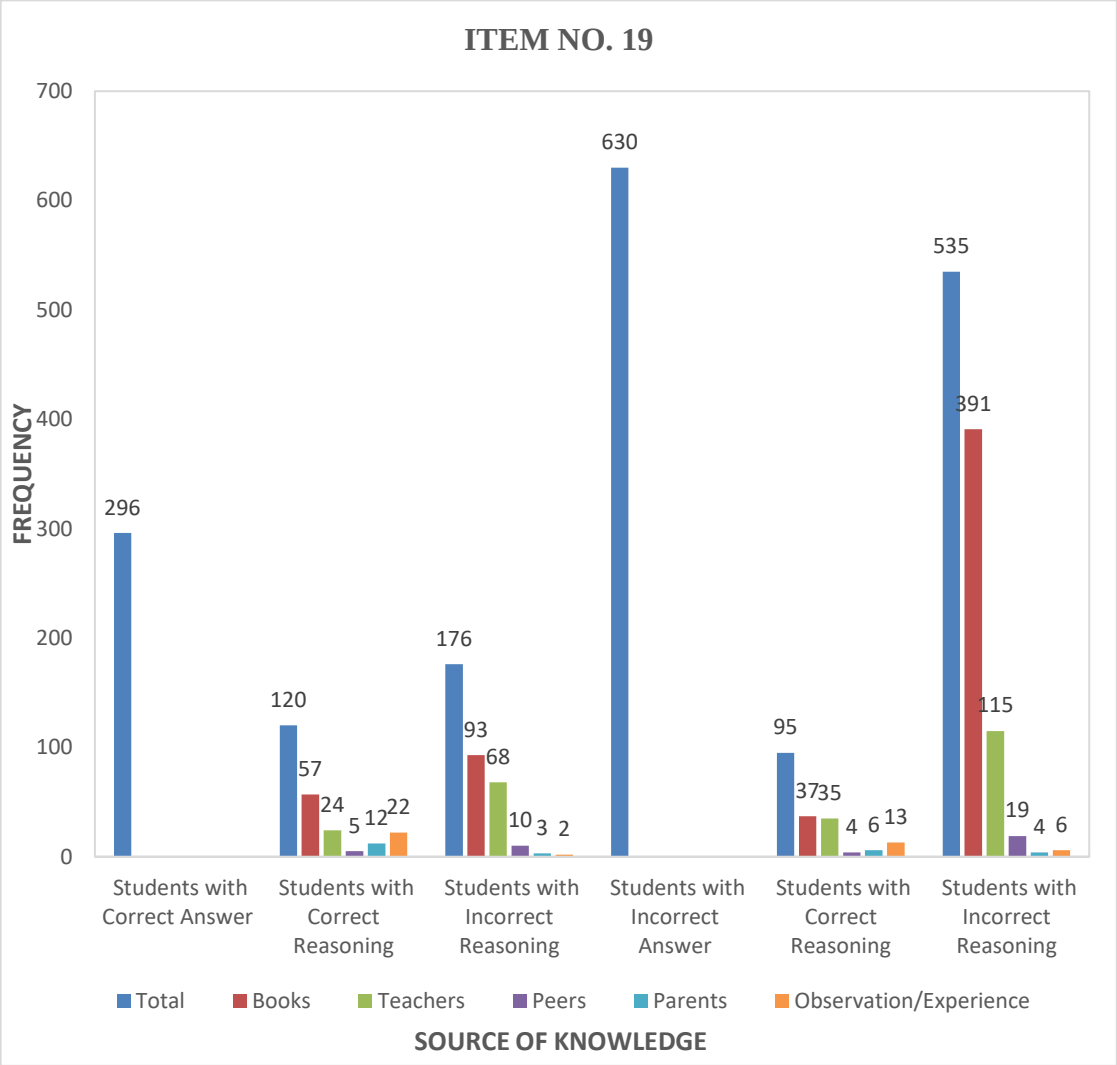
Out of 926 students 704 (76.02%) students considered books as their primary source of knowledge followed by teachers 147 (15.87%), peers 12 (1.29%), parents 8 (0.86%) and observations/experiences 55 (5.93%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 41 (4.42%) students had complete understanding of concept, 273 (29.49%) students had partial understanding of concept and 612 (66.09%) students had complete misunderstanding of concept or misconception.

Table_4.23 Student's Reasons and Source of Knowledge (Physics)

Item No. 19	Leaves fall from the tree due to gravitational force.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	296(32.00)	120(40.54)	176(59.46)	630(68.00)	95(15.08)	535(84.92)
Source of Knowledge						
Books		57(47.50)	93(52.84)		37(38.95)	391(73.08)
Teachers		24(20.00)	68(38.64)		35(36.84)	115(21.50)
Peers		5(4.17)	10(5.68)		4(4.12)	19(3.55)
Parents		12(10.00)	3(1.70)		6(6.32)	4(0.75)
Observation /Experience		22 (18.33)	2(1.14)		13(13.68)	6(1.12)

Graph_4.23 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.23 it is evident that regarding item No. 19 out of 926 students 296 (32%) students had given correct answers. Out of 296 (32 %) students who had given correct answers 120 (40.54%) students had given correct reasoning while 176 (59.46 %) students had given incorrect reasoning. Out of 120 (40.54%) students who had given correct reasoning 57 (47.50%) students considered books as their primary source of knowledge followed by teachers-24 (20%), peers-5 (4.17%), parents-12 (10%), and observation/experience-22 (18.33%). Out of 176 (59.46%) students who had given incorrect reasoning 93 (52.84%) students considered books as their primary source of knowledge followed by teachers-68 (38.64 %), peers-10 (5.68%), parents-3 (1.70%) and observation/experience-2 (1.14%).

While out of 926 students 630 (68.00%) students had given incorrect answers. Out of 630 (68%) students who had given incorrect answers 95 (15.08%) students had given correct reasoning while 535 students had given incorrect reasoning. Out of 95 (15.08%) students who had given correct reasoning, 37 (38.95%) students considered books as their primary source of knowledge followed by teachers-35 (36.84%), peers-4 (4.12%), parents-6 (6.32%) and observation/experience 13 (13.68%). Out of 535 (84.92%) students who had given incorrect reasoning, 391 (73.08%) students considered books as their primary source of knowledge followed by teachers-115 (21.50%), peers-19 (3.55 %), parents-4 (0.75%) and observation/experience-6 (1.12%).

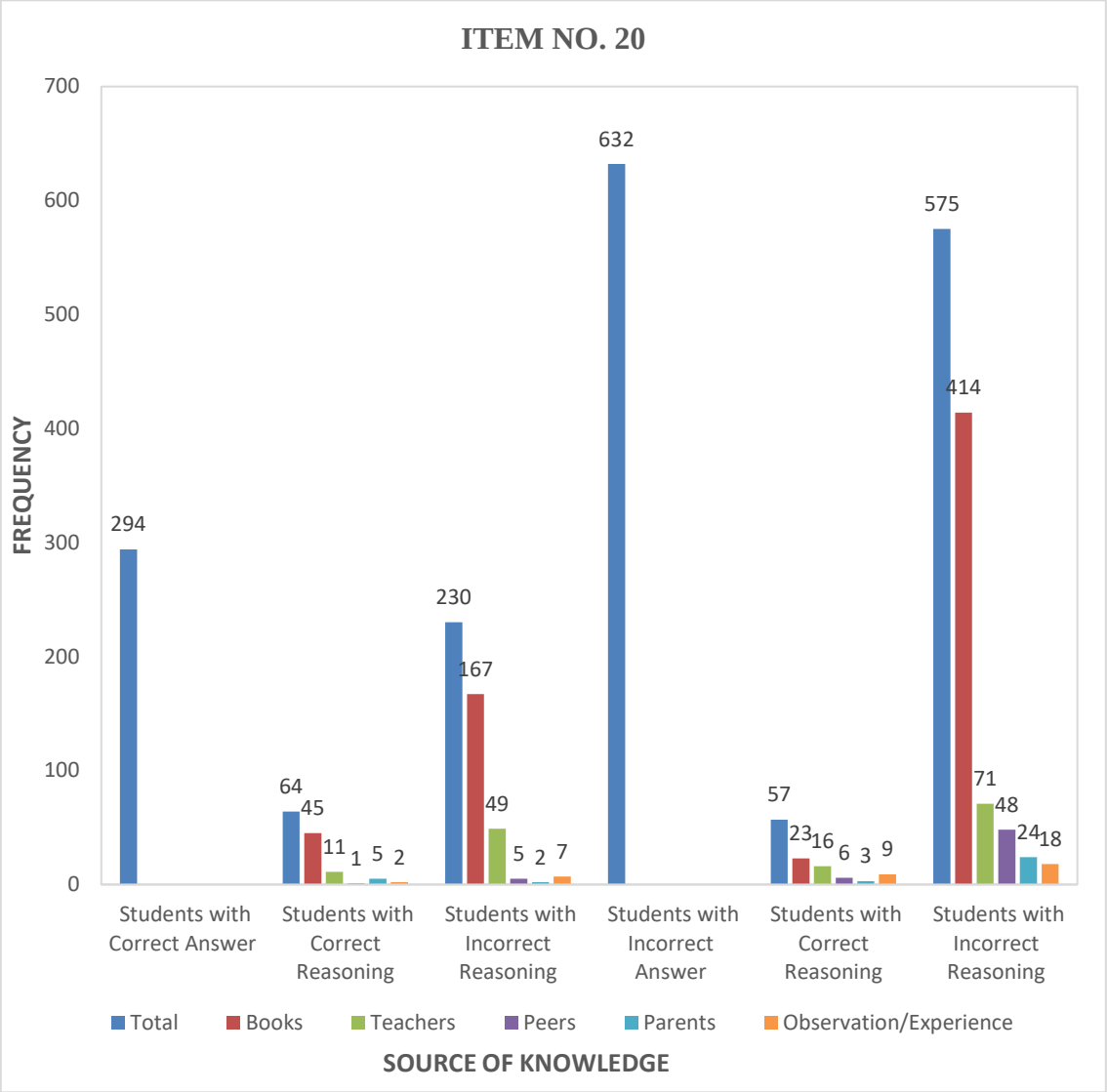
Out of 926 students 578 (62.41%) students considered books as their primary source of knowledge followed by teachers 242 (26.13%), peers 38 (4.10%), parents 25 (2.69%) and observations/experiences 43 (4.64%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 120 (12.96%) students had complete understanding of concept, 271 (29.26%) students had partial understanding of concept and 535 (57.78%) students had complete misunderstanding of concept or misconception.

Table_4.24 Student's Reasons and Source of Knowledge (Physics)

Item No. 20	When a box kept on a table is pushed towards right the force of friction will act towards left.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	294(31.70)	64(21.76)	230(78.24)	632(68.30)	57(9.02)	575(90.98)
Source of Knowledge						
Books		45(70.30)	167(72.61)		23(40.35)	414(72.00)
Teachers		11(17.19)	49(21.30)		16(28.07)	71(12.35)
Peers		1(1.56)	5(2.17)		6(10.53)	48(8.35)
Parents		5(7.81)	2(0.87)		3(5.26)	24(4.17)
Observation /Experience		2(3.13)	7(3.04)		9(15.79)	18(3.13)

Graph_4.24 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.24 it is evident that regarding item No. 20 out of 926 students 294 (31.70%) students had given correct answers. Out of 294 (31.70%) students who had given correct answers 64 (21.76%) students had given correct reasoning while 230 (78.24%) students had given incorrect reasoning. Out of 64 (21.76%) students who had given correct reasoning 45 (70.30%) students considered books as their primary source of knowledge followed by teachers-11 (17.19%), peers-1 (1.56%), parents-5 (7.81%) and observation/experience-2 (3.13%). Out of 230 (78.24%) students who had given incorrect reasoning 167 (72.61%) students considered books as their primary source of knowledge followed by teachers-49 (21.30%), peers-5 (2.17%), parents-2 (0.87%) and observation/experience-7 (3.04%).

While out of 926 students 632 students had given incorrect answers. Out of 632 (68.30 %) students who had given incorrect answers 57 (9.02%) students had given correct reasoning while 535 (90.98%) students had given incorrect reasoning. Out of 57 (9.02 %) students who had given correct reasoning, 23 (40.35%) students considered books as their primary source of knowledge followed by teachers-16 (28.07%), peers-6 (10.53 %), parents-3 (5.26%) and observation/experience- 9 (15.79%). Out of 575 (90.98%) students who had given incorrect reasoning, 414 (72%) students considered books as their primary source of knowledge followed by teachers-71 (12.35%), peers-48 (8.35 %), parents-24 (4.17%) and observation/experience-18 (3.13%).

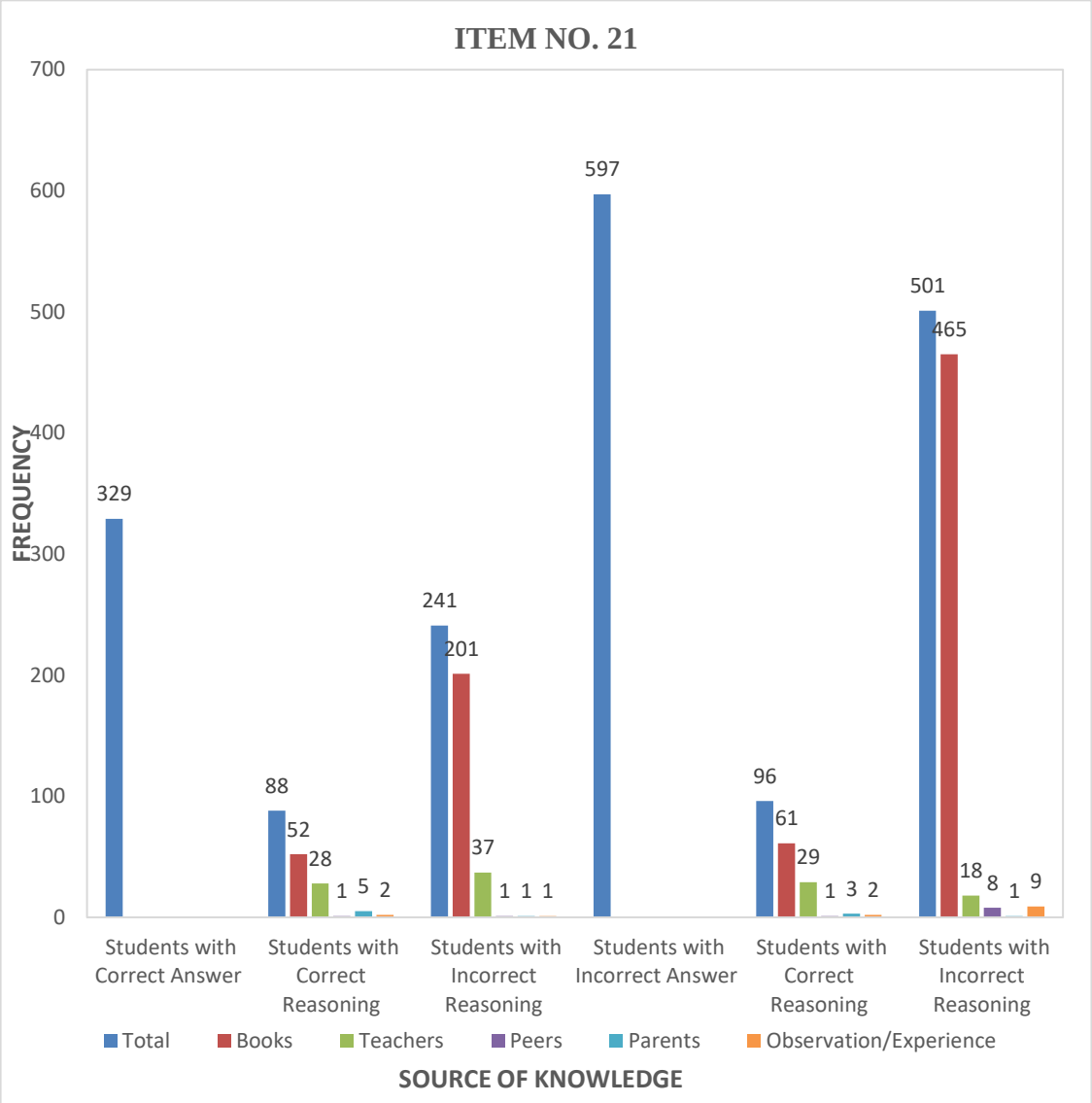
Out of 926 students 649 (70.08%) students considered books as their primary source of knowledge followed by teachers 147 (15.87%), peers 60 (6.47%), parents 34 (3.67%) and observations/experiences 36 (3.88%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 64 (6.92%) students had complete understanding of concept, 287 (30.99%) students had partial understanding of concept and 575 (62.09%) students had complete misunderstanding of concept or misconception.

Table_4.25 Student's Reasons and Source of Knowledge (Physics)

Item No. 21	We are not crushed under weight of air because pressure inside our body is equal to atmospheric pressure.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	329(35.50)	88(26.75)	241(73.25)	597(64.50)	96(36.39)	501(83.92)
Source of Knowledge						
Books		52(59.90)	201(83.40)		61(63.54)	465(92.81)
Teachers		28(31.82)	37(15.35)		29(30.21)	18(3.59)
Peers		1(1.14)	1(0.41)		1(1.04)	8(1.60)
Parents		5(5.68)	1(0.41)		3(3.13)	1(0.20)
Observation /Experience		2(2.27)	1(0.41)		2(2.08)	9(1.80)

Graph_4.25 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.25 it is evident that regarding item No. 21 out of 926 students 329 (35.50%) students had given correct answers. Out of 329 (35.50%) students who had given correct answers 88 (26.75%) students had given correct reasoning while 241 (73.25%) students had given incorrect reasoning. Out of 88 (26.75%) students who had given correct reasoning 52 (59.90%) students considered books as their primary source of knowledge followed by teachers-28 (31.82%), peers-1 (1.14%), parents-5 (5.68%) and observation/experience-2 (2.27%). Out of 241 (73.25%) students who had given incorrect reasoning 201 (83.40%) students considered books as their primary source of knowledge followed by teachers-37 (15.35%), peers-1 (0.41%), parents-1 (0.41%) and observation/experience-1 (0.41%).

While out of 926 students 597 (64.50%) students had given incorrect answers. Out of 597 (64.50%) students who had given incorrect answers 96 (36.39%) students had given correct reasoning while 501 (83.92%) students had given incorrect reasoning. Out of 96 (36.39 %) students who had given correct reasoning, 61 (63.54%) students considered books as their primary source of knowledge followed by teachers-29 (30.21%), peers-1 (1.04 %), parents-3 (3.13%) and observation/experience- 2 (2.08%). Out of 501(83.92 %) students who had given incorrect reasoning, 465 (92.81%) students considered books as their primary source of knowledge followed by teachers-18 (3.59%), peers-8 (1.60%), parents-1 (0.20%) and observation/experience-9 (1.80%).

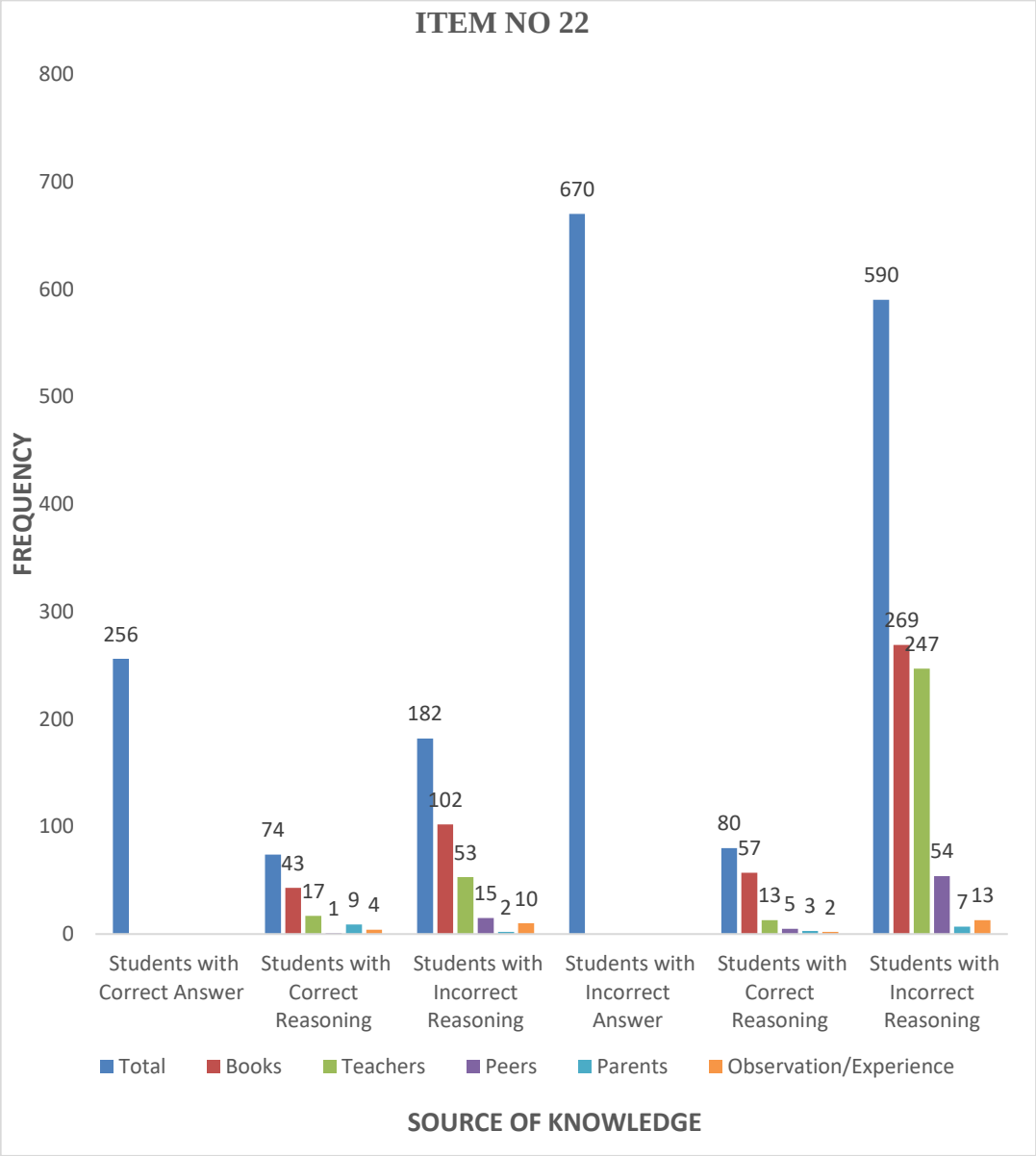
Out of 926 students 779 (84.12%) students considered books as their primary source of knowledge followed by teachers 112 (12.09%), peers 11 (1.18%), parents 10 (1.07%) and observations/experiences 14 (1.51%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 64 (6.92%) students had complete understanding of concept, 287 (30.99%) students had partial understanding of concept and 575 (62.09%) students had complete misunderstanding of concept or misconception.

Table_4.26 Student's Reasons and Source of Knowledge (Physics)

Item No. 22	Gravitational force acts on a bird sitting on a tree.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	256(27.60)	74(28.90)	182(71.10)	670(72.40)	80(11.94)	590(88.06)
Source of Knowledge						
Books		43(58.11)	102(56.04)		57(71.25)	269(45.59)
Teachers		17(22.97)	53(29.12)		13(16.25)	247(41.86)
Peers		1(1.35)	15(8.24)		5(6.25)	54(9.15)
Parents		9(12.16)	2(1.10)		3(3.75)	7(1.19)
Observation /Experience		4(5.41)	10(5.49)		2(2.50)	13(2.20)

Graph_4.26 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.26 it is evident that regarding item No. 22 out of 926 students 256 (27.60%) students had given correct answers. Out of 256 (27.60%) students who had given correct answers 74 (28.90%) students had given correct reasoning while 182 (71.10%) students had given incorrect reasoning. Out of 74 (28.90%) students who had given correct reasoning 43 (58.11%) students considered books as their primary source of knowledge followed by teachers-17 (22.97%), peers-1 (1.35%), parents-9 (12.16%), and observation/experience-4 (5.41%). Out of 182 (71.10%) students who had given incorrect reasoning 102 (56.04%) students considered books as their primary source of knowledge followed by teachers-53 (29.12%), peers-15 (8.24%), parents-2 (1.10%) and observation/experience-10 (5.49%).

While out of 926 students 670 (72.40%) students who had given incorrect answers 80 (11.94 %) students had given correct reasoning while 590 (88.06%) students had given incorrect reasoning. Out of 80 (11.94%) students who had given correct reasoning, 57 (71.25%) students considered books as their primary source of knowledge followed by teachers-13 (16.25%), peers-5 (6.25%), parents-3 (3.75%) and observation/experience-2 (2.50 %). Out of 590 students who had given incorrect reasoning, 269 (45.59%) students considered books as their primary source of knowledge followed by teachers-247 (41.86%), peers-54 (9.15%), parents-7 (1.19%) and observation/experience-13 (2.20%).

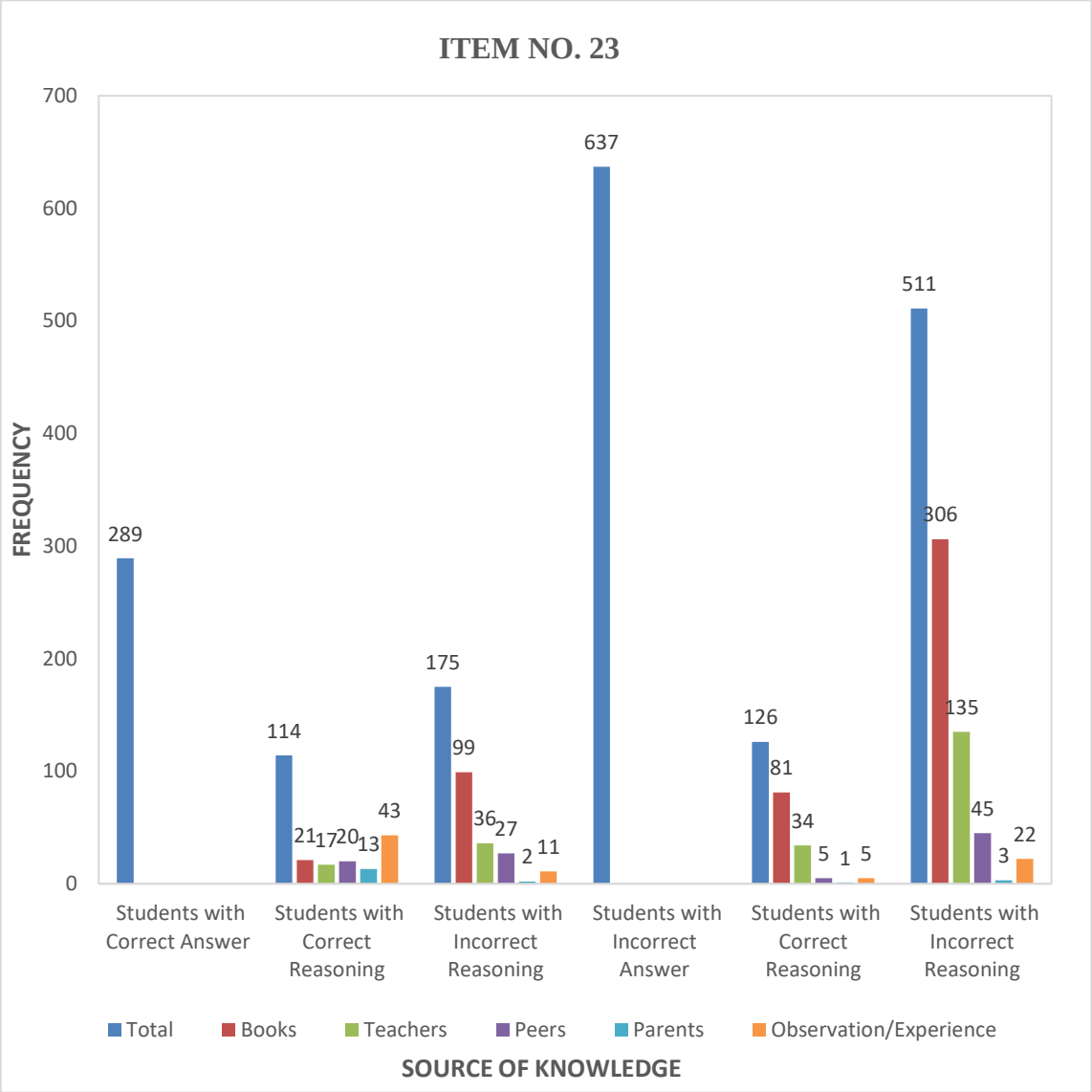
Out of 926 students 471 (50.86 %) students considered books as their primary source of knowledge followed by teachers 330 (34.55%), peers 75 (8.09 %), parents 21 (2.26 %) and observations/experiences 29 (3.13%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 74 (7.99%) students had complete understanding of concept, 262 (28.29%) students had partial understanding of concept and 575 (63.72%) students had complete misunderstanding of concept or misconception.

Table_4.27 Student's Reasons and Source of Knowledge (Physics)

Item No. 23	While walking we pull the ground.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	289(31.20)	114(39.45)	175(60.55)	637(68.80)	126(19.78)	511(80.22)
Source of Knowledge						
Books		21(18.42)	99(56.57)		81(64.29)	306(59.88)
Teachers		17(14.91)	36(20.57)		34(26.98)	135(26.42)
Peers		20(17.54)	27(15.43)		5(3.97)	45(8.81)
Parents		13(11.40)	2(1.14)		1(0.79)	3(0.59)
Observation /Experience		43(37.72)	11(6.29)		5(3.97)	22(4.31)

Graph_4.27 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.27 it is evident that regarding item No. 23 out of 926 students 289 (31.20 %) students had given correct answers. Out of 289 (31.20%) students who had given correct answers 114 (39.45%) students had given correct reasoning while 175 (60.55%) students had given incorrect reasoning. Out of 114 (39.45%) students who had given correct reasoning 21 (18.42%) students considered books as their primary source of knowledge followed by teachers-17 (14.91%), peers-20 (17.54%), parents-13 (11.40%) and observation/experience-43 (37.72%). Out of 175 (60.55%) students who had given incorrect reasoning 99 (56.57%) students considered books as their primary source of knowledge followed by teachers-36 (20.57%), peers-27 (15.43%), parents-2 (1.14%) and observation/experience-11 (6.29%).

While out of 926 students 637 (68.80%) students had given incorrect answers. Out of 637 (68.80%) students who had given incorrect answers 126 (19.78%) students had given correct reasoning while 511 (80.22%) students had given incorrect reasoning. Out of 126 students who had given correct reasoning, 81(64.29%) students considered books as their primary source of knowledge followed by teachers-34 (26.98%), peers-5 (3.97%), parents-1 (0.79%) and observation/experience- 5 (3.97%). Out of 511 (80.22 %) students who had given incorrect reasoning, 306 (59.88%) students considered books as their primary source of knowledge followed by teachers-135 (26.42%), peers-45 (8.81%), parents-3 (0.59%) and observation/experience-22 (4.31%).

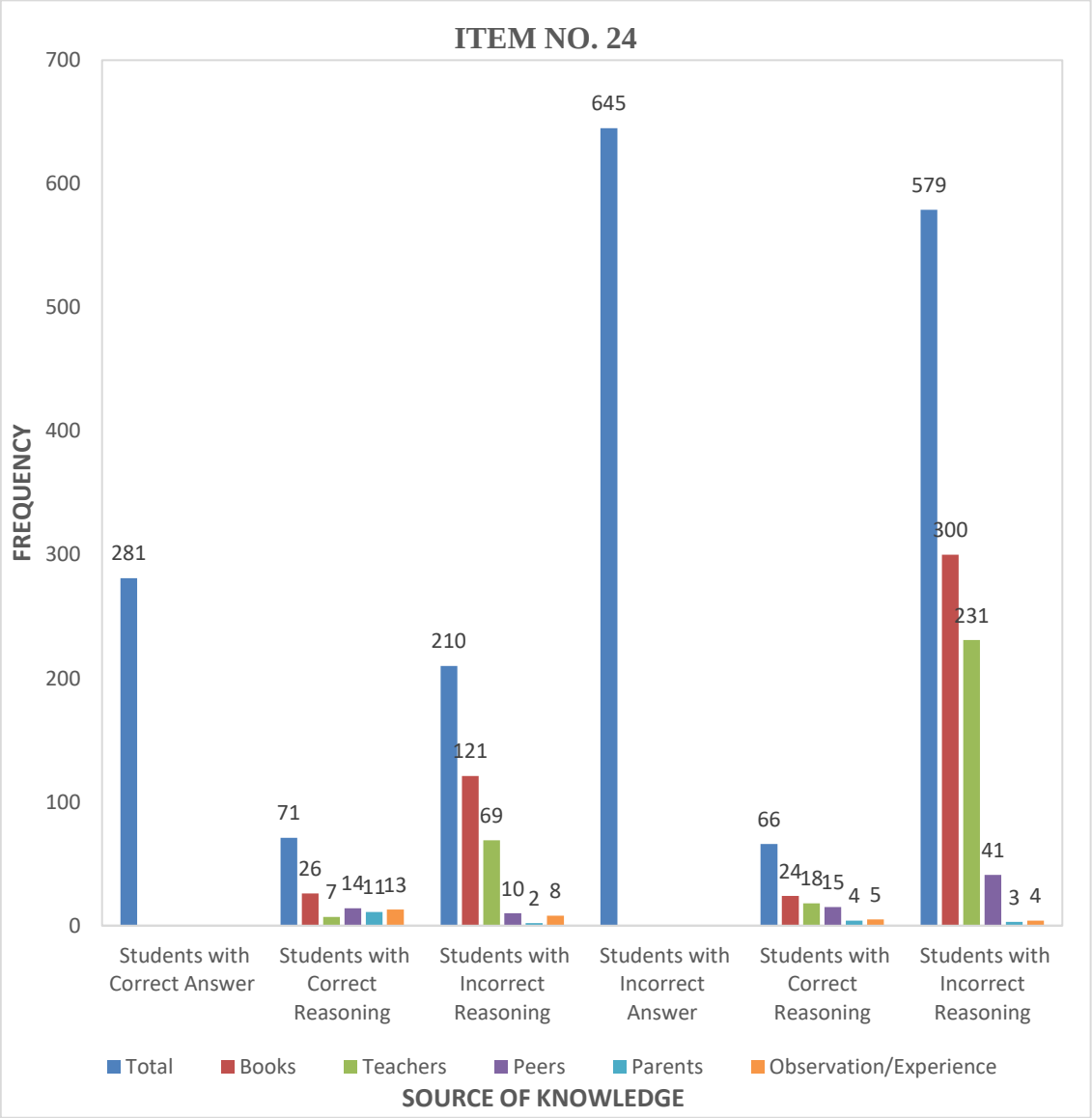
Out of 926 students 507 (54.75%) students considered books as their primary source of knowledge followed by teachers 222 (23.97%), peers 37 (3.99%), parents 19 (2.05%) and observations/experiences 81 (8.74%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 114 (12.31%) students had complete understanding of concept, 301 (32.50%) students had partial understanding of concept and 511 (55.19%) students had complete misunderstanding of concept or misconception.

Table_4.28 Student's Reasons and Source of Knowledge (Physics)

Item No. 24	An aeroplane flying in the air experiences no friction.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	281(30.30)	71(25.27)	210(74.73)	645(69.70)	66(10.23)	579(89.77)
Source of Knowledge						
Books		26(36.62)	121(57.62)		24(36.36)	300(51.81)
Teachers		7(9.86)	69(32.86)		18(27.27)	231(39.90)
Peers		14(19.72)	10(4.76)		15(22.72)	41(7.08)
Parents		11(15.45)	2(0.95)		4(6.06)	3(0.52)
Observation /Experience		13(18.31)	8(3.81)		5(7.57)	4(0.69)

Graph_4.28 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.28 it is evident that regarding item No. 24 out of 926 students 281 (30.30%) students had given correct answers. Out of 281 (30.30%) students who had given correct answers 71 (25.27%) students had given correct reasoning while 210 (74.73%) students had given incorrect reasoning. Out of 71 (25.27%) students who had given correct reasoning 26 (36.62%) students considered books as their primary source of knowledge followed by teachers-7 (9.86%), peers-14 (19.72%), parents-11 (15.45%) and observation/experience-13 (18.31%). Out of 210 (74.73%) students who had given incorrect reasoning 121 (57.62%) students considered books as their primary source of knowledge followed by teachers-69 (32.86%), peers-10 (7.76%), parents-2 (0.95%) and observation/experience-8 (3.81%).

While out of 926 students 645 (69.70%) students had given incorrect answers. Out of 645 (69.70%) students who had given incorrect answers 66 (10.23%) students had given correct reasoning while 579 (89.77%) students had given incorrect reasoning. Out of 66 (10.23%) students who had given correct reasoning, 24 (36.36%) students considered books as their primary source of knowledge followed by teachers-18 (27.27%), peers-15 (22.72%), parents-4 (6.06%) and observation/experience- 5 (7.57%). Out of 579 (89.77 %) students who had given incorrect reasoning, 300 (51.81%) students considered books as their primary source of knowledge followed by teachers-231 (39.90%), peers-41 (7.08%), parents-3 (0.52%) and observation/experience-4 (0.69%).

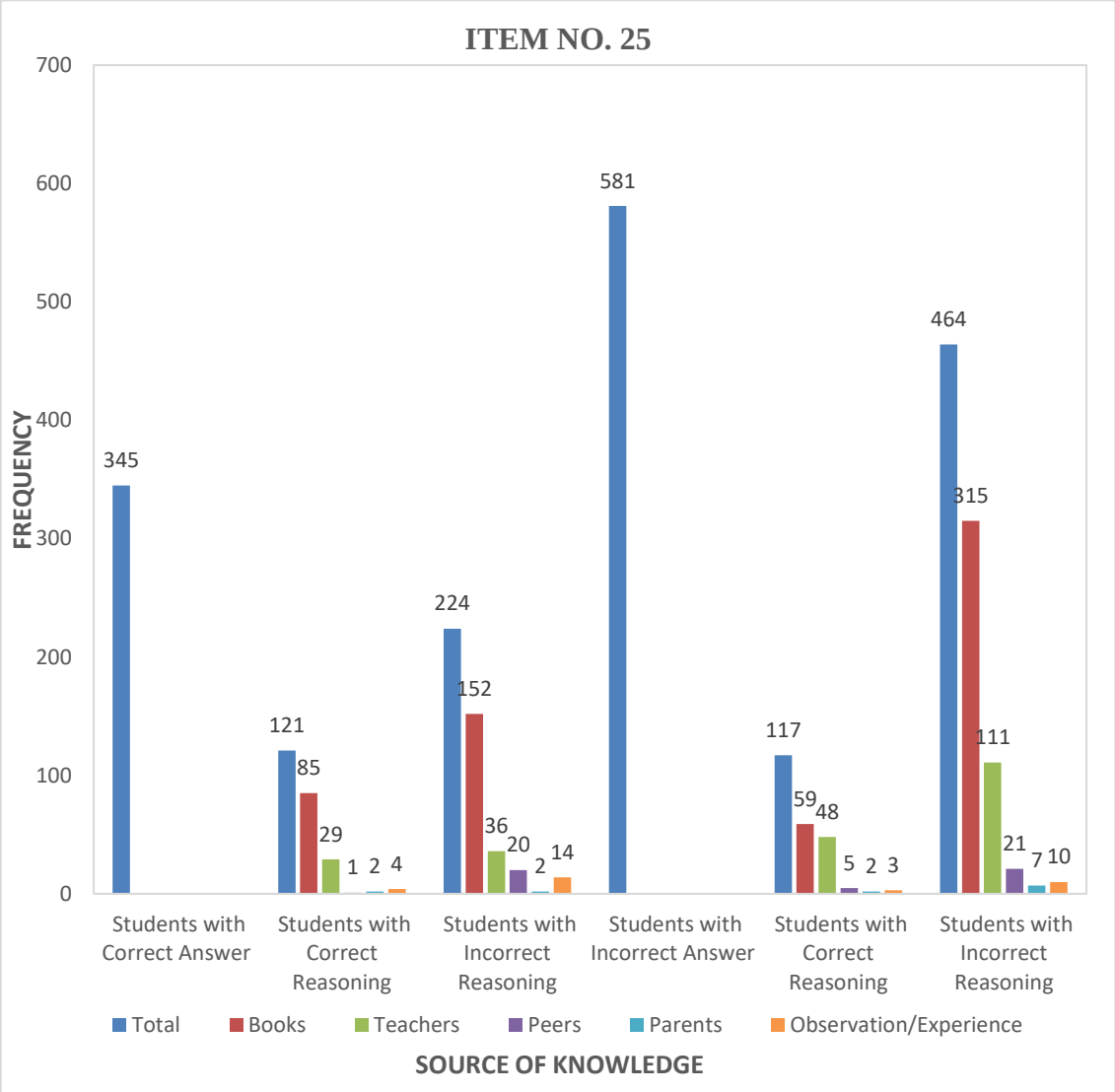
Out of 926 students 471 (50.86%) students considered books as their primary source of knowledge followed by teachers 325 (35.09%), peers 80 (8.63 %), parents 20 (2.15%) and observations/experiences 30 (3.23%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 71 (7.67%) students had complete understanding of concept, 276 (29.80%) students had partial understanding of concept and 579 (62.53%) students had complete misunderstanding of concept or misconception.

Table_4.29 Student's Reasons and Source of Knowledge (Physics)

Item No. 25	A can gets crushed when we suck all air from it.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	345(37.30)	121(35.07)	224(64.93)	581(62.70)	117(20.14)	464(79.86)
Source of Knowledge						
Books		85(70.25)	152(67.86)		59(50.43)	315(67.89)
Teachers		29 (23.97)	36(16.07)		48(41.03)	111(23.92)
Peers		1(0.83)	20(8.93)		5(4.27)	21(4.53)
Parents		2(1.65)	2(0.89)		2(1.71)	7(1.51)
Observation /Experience		4(3.31)	14(6.25)		3(2.56)	10(2.16)

Graph_4.29 Students Reasons and Source of Knowledge (Physics)



From table and graph 4.29 it is evident that regarding item No. 25 out of 926 students 345 (37.30%) students had given correct answers. Out of 345 (37.30%) students who had given correct answers 121 (35.07%) students had given correct reasoning while 224 (64.93%) students had given incorrect reasoning. Out of 121 (35.07%) students who had given correct reasoning 85 (70.25%) students considered books as their primary source of knowledge followed by teachers-29 (23.97%), peers-1 (0.83%), parents-2 (1.65%) and observation/experience-4 (3.31%). Out of 224 (64.93%) students who had given incorrect reasoning 152 (67.86%) students considered books as their primary source of knowledge followed by teachers-36 (16.07%), peers-20 (8.93%), parents-2 (0.89%) and observation/experience-14 (6.25%).

While out of 926 students 581 (62.70%) students had given incorrect answers. Out of 581 (62.70%) students who had given incorrect answers 117 (20.14%) students had given correct reasoning while 464 (79.86%) students had given incorrect reasoning. Out of 117 (20.14%) students who had given correct reasoning, 59 (50.43%) students considered books as their primary source of knowledge followed by teachers-48 (41.03 %), peers-5 (4.27%), parents-2 (1.71%) and observation/experience- 3 (2.56%). Out of 464 (79.86%) students who had given incorrect reasoning, 315 (67.89%) students considered books as their primary source of knowledge followed by teachers-111 (23.92 %), peers-21 (4.53%), parents-7 (1.51%) and observation/experience-10 (2.16%).

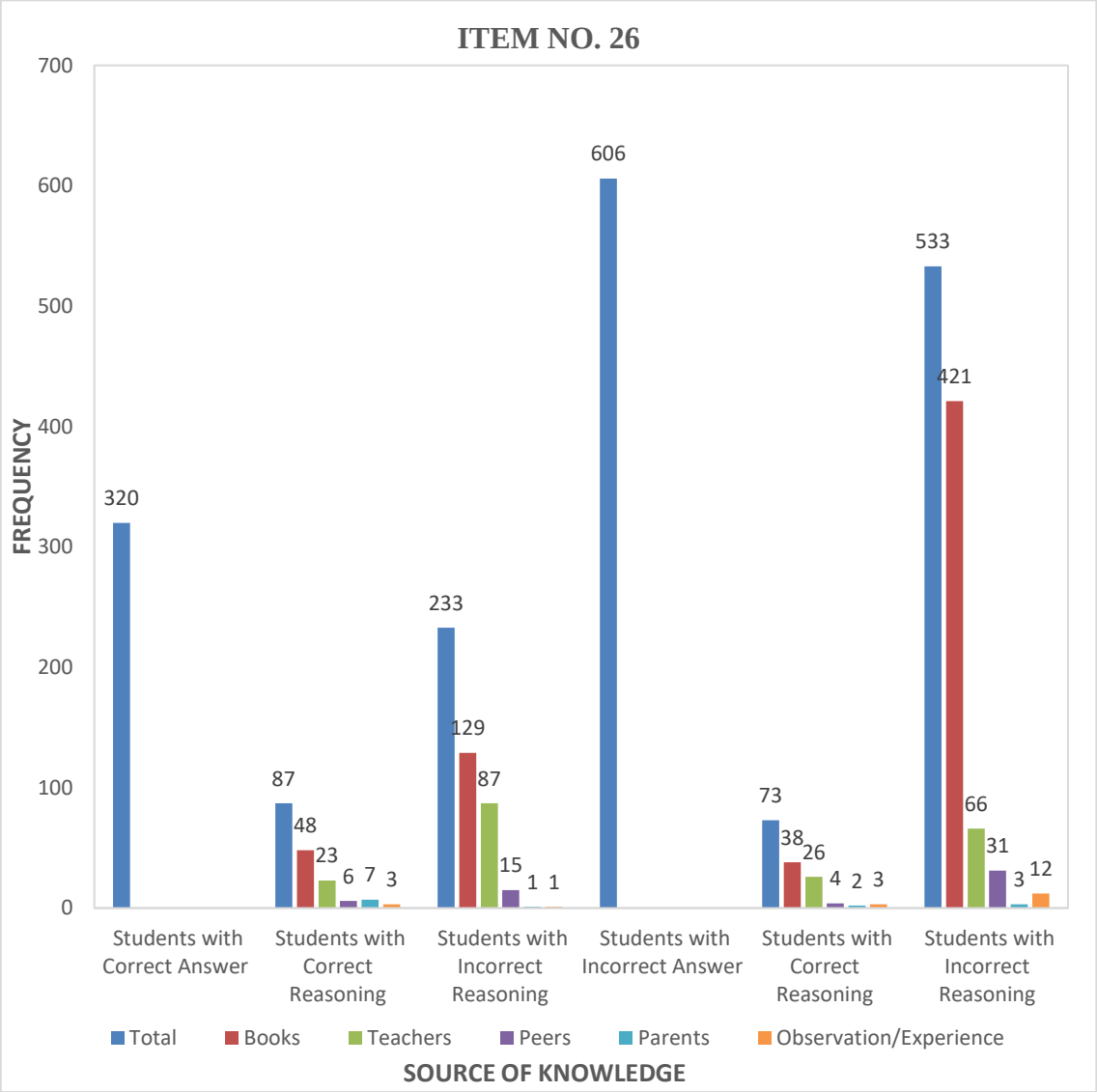
Out of 926 students 611 (65.98%) students considered books as their primary source of knowledge followed by teachers 224 (24.19%), peers 47 (5.07%), parents 13 (1.40%) and observations/experiences 31 (3.34%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 121 (13.06%) students had complete understanding of concept, 341 (36.82%) students had partial understanding of concept and 464 (62.53%) students had complete misunderstanding of concept or misconception.

Table_4.30 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 26	All metals are solid at room temperature.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	320(27.18)	87(27.18)	233(72.82)	606(65.40)	73(12.05)	533(87.95)
Source of Knowledge						
Books		48(55.17)	129(55.36)		38(52.05)	421(78.99)
Teachers		23 (26.44)	87(37.34)		26 (35.62)	66(12.38)
Peers		6(6.90)	15(6.44)		4(5.48)	31(5.82)
Parents		7(8.05)	1(0.43)		2(2.74)	3(0.56)
Observation /Experience		3(3.45)	1(0.43)		3(4.11)	12(2.25)

Graph_4.30 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.30 it is evident that regarding item No. 26 out of 926 students 320 (27.18%) students had given correct answers. Out of 320 (27.18%) students who had given correct answers 87 (27.18%) students had given correct reasoning while 233 (72.82%) students had given incorrect reasoning. Out of 87 (27.18%) students who had given correct reasoning 48 (55.17%) students considered books as their primary source of knowledge followed by teachers-23 (26.44%), peers-6 (6.90%), parents-7(8.05%) and observation/experience-3 (3.45%). Out of 233 (72.82%) students who had given incorrect reasoning 129 (55.36%) students considered books as their primary source of knowledge followed by teachers-87 (37.34%), peers-15 (6.44%), parents-1 (0.43%) and observation/experience-1 (0.43%).

While out of 926 students 606 (65.40%) students had given incorrect answers. Out of 606 (65.40%) students who had given incorrect answers 73 (12.05%) students had given correct reasoning while 533 (87.95%) students had given incorrect reasoning. Out of 73 (12.05%) students who had given correct reasoning, 38 (52.05%) students considered books as their primary source of knowledge followed by teachers-26 (35.62%), peers-4 (5.48%), parents-2 (2.74%) and observation/experience- 3 (4.11%). Out of 533 (87.95 %) students who had given incorrect reasoning, 421 (78.99%) students considered books as their primary source of knowledge followed by teachers-66 (12.38%), peers-31 (5.82%), parents-3 (0.56%) and observation/experience-12 (2.25%).

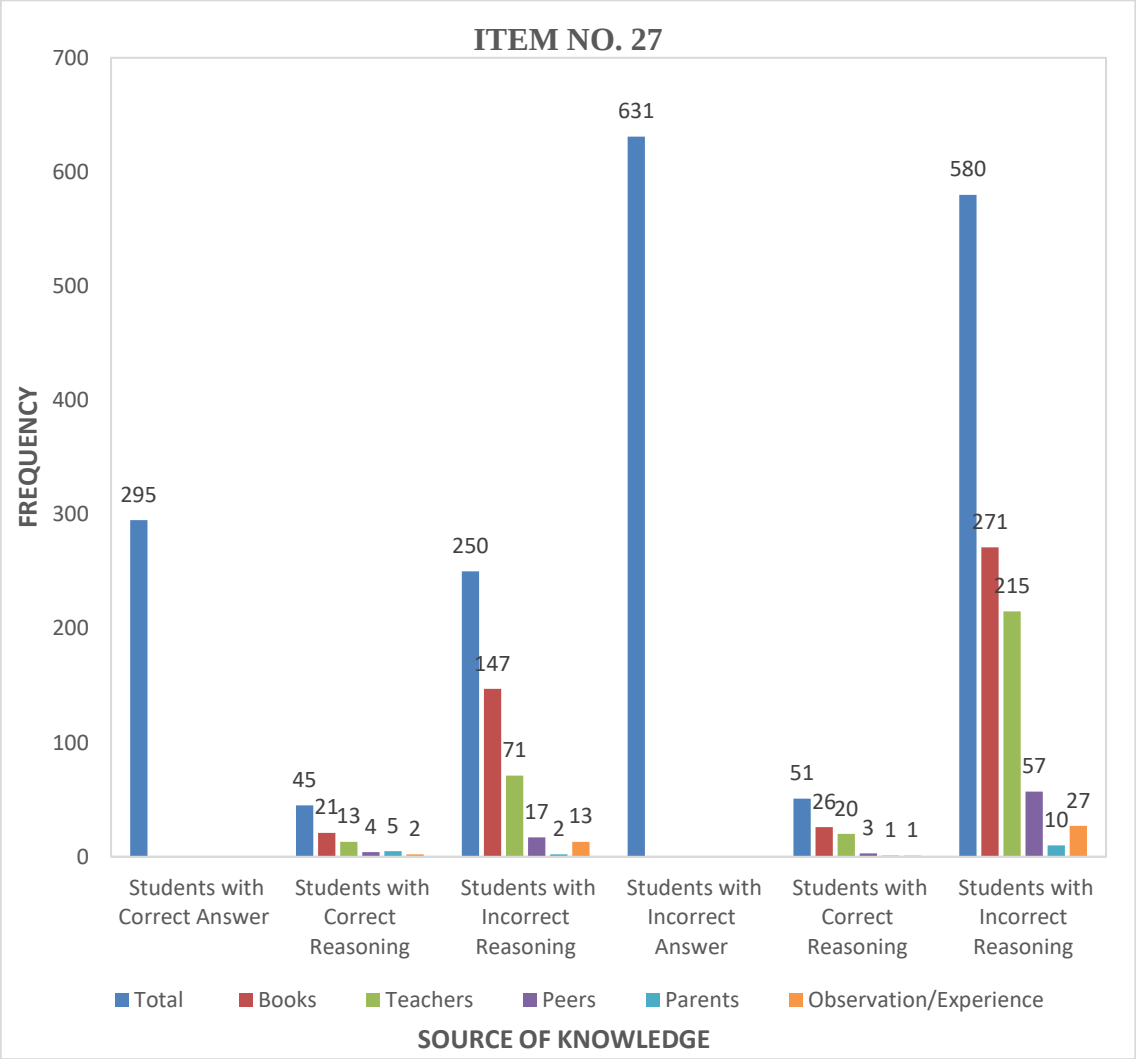
Out of 926 students 636 (68.68%) students considered books as their primary source of knowledge followed by teachers 202 (21.81%), peers 56 (6.04%), parents 13 (1.40%) and observations/experiences 19 (2.05%).

Thus, it can be concluded that majority of students considered books as their primary source of knowledge. Thus, it can be concluded that out of 926 students 87 (9.39%) students had complete understanding of concept, 306 (33.05%) students had partial understanding of concept and 533 (57.96%) students had complete misunderstanding of concept or misconception.

Table_4.31 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 27	Graphite is a good conductor of electricity.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	295(31.90)	45(15.25)	250(84.75)	631(68.10)	51(8.08)	580(91.92)
Source of Knowledge						
Books		21(55.17)	147(55.36)		26(50.98)	271(46.72)
Teachers		13 (26.44)	71(37.34)		20 (39.21)	215(37.06)
Peers		4(6.90)	17(6.44)		3(5.88)	57(9.82)
Parents		5(8.05)	2(0.43)		1(1.96)	10(1.72)
Observation /Experience		2(3.45)	13(0.43)		1(1.96)	27(4.65)

Graph_4.31 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.31 it is evident that regarding item No. 27 out of 926 students 295 (31.90%) students had given correct answers. Out of 295 (31.90%) students who had given correct answers 45 (15.25%) students had given correct reasoning while 250 (84.75%) students had given incorrect reasoning. Out of 45 (15.25%) students who had given correct reasoning 21 (55.17%) students considered books as their primary source of knowledge followed by teachers-13 (26.44%), peers-4 (6.90%), parents-5 (8.05%) and observation/experience-2 (3.45 %). Out of 250 (84.75%) students who had given incorrect reasoning 147 (55.36%) students considered books as their primary source of knowledge followed by teachers-71 (37.34%), peers-17 (6.44%), parents-2 (0.43%) and observation/experience-13 (0.43%).

While out of 926 students 631 (68.10%) students had given incorrect answers. Out of 631 (68.10%) students who had given incorrect answers 51 (8.08%) students had given correct reasoning while 580 (91.92%) students had given incorrect reasoning. Out of 51 (8.08%) students who had given correct reasoning, 26 (50.98%) students considered books as their primary source of knowledge followed by teachers-20 (39.21%), peers-3 (5.88%), parents-1 (1.96%) and observation/experience-1 (1.96 %). Out of 580 (91.92 %) students who had given incorrect reasoning, 271 (46.72%) students considered books as their primary source of knowledge followed by teachers-215 (37.06%), peers-57 (9.82%), parents-10 (1.72%) and observation/experience-27 (4.65%).

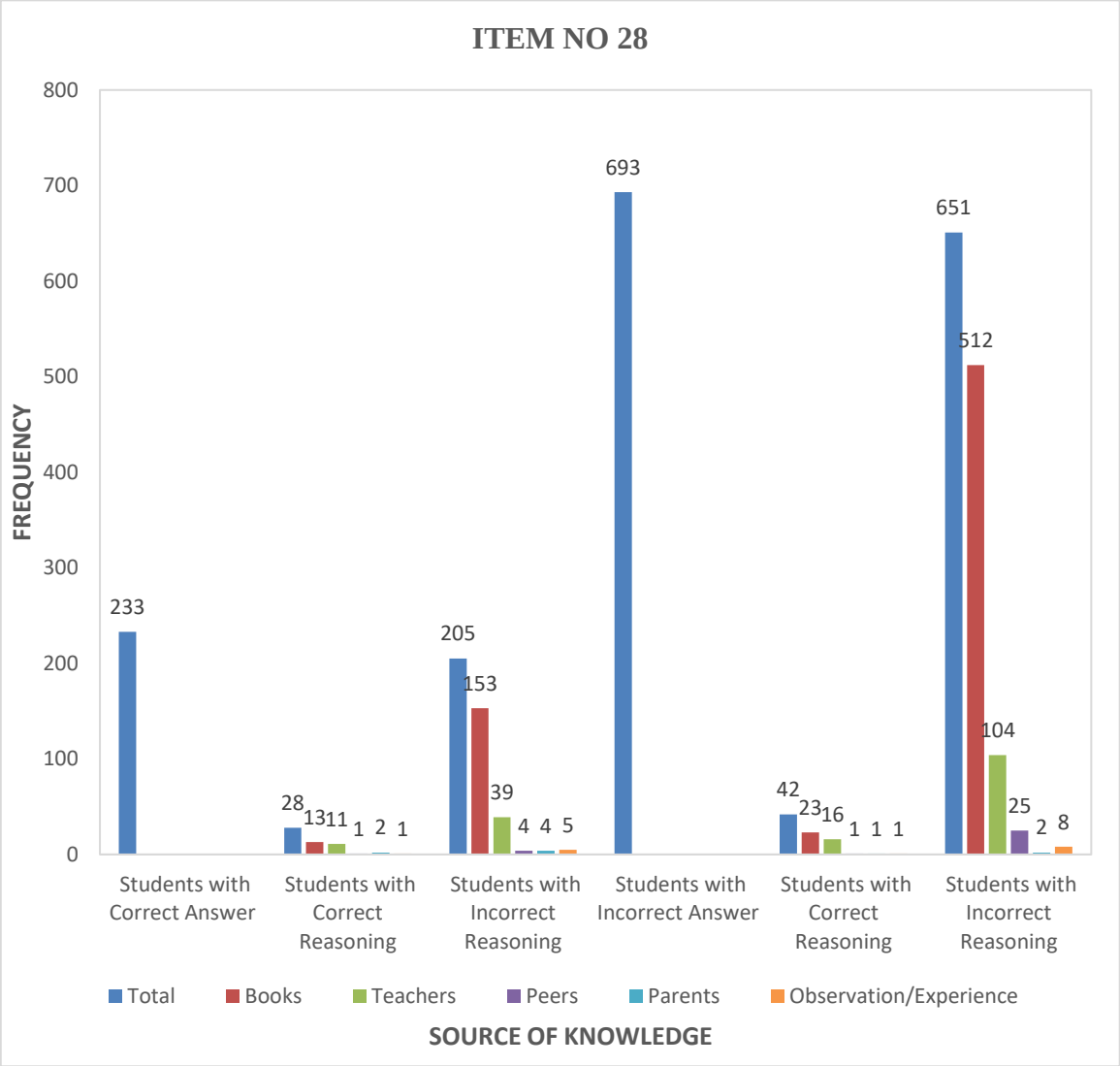
Out of 926 students 465 (50.21%) students considered books as their primary source of knowledge followed by teachers 319 (34.44%), peers 81 (8.74%), parents 18 (1.94%) and observations/experiences 43 (4.64%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 45 (4.86%) students had complete understanding of concept, 301 (32.50%) students had partial understanding of concept and 580 (62.64%) students had complete misunderstanding of concept or misconception.

Table_4.32 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 28	**Metallic oxides are acidic in nature.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & (%) of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**233(25.20)**	**28(12.02)**	**205(87.98)**	**693(74.80)**	**42(6.06)**	**651(93.94)**
Source of Knowledge						
Books		**13(46.43)**	**153(74.63)**		**23(54.76)**	**512(78.65)**
Teachers		**11 (39.29)**	**39(19.02)**		**16 (38.10)**	**104(15.98)**
Peers		**1(3.57)**	**4(1.95)**		**1(2.38)**	**25(3.84)**
Parents		**2(7.14)**	**4(1.95)**		**1(2.38)**	**2(0.31)**
Observation /Experience		**1(3.57)**	**5(2.44)**		**1(2.38)**	**8(1.23)**

Graph_4.32 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.32 it is evident that regarding item No. 28 out of 926 students 233 (25.20%) students had given correct answers. Out of 233 (25.20%) students who had given correct answers 28 (12.02%) students had given correct reasoning while 205 (87.98%) students had given incorrect reasoning. Out of 28 (12.02%) students who had given correct reasoning 13 (46.43%) students considered books as their primary source of knowledge followed by teachers-11 (39.29%), peers-1 (3.57%), parents-2 (7.14%) and observation/experience-1 (3.57%). Out of 205 (87.98 %) students who had given incorrect reasoning 153 (74.63%) students considered books as their primary source of knowledge followed by teachers-39 (19.02%), peers-4 (1.95%), parents-4 (1.95%) and observation/experience-5 (2.44%).

While out of 926 students 693 (74.80%) students had given incorrect answers. Out of 693 (74.80%) students who had given incorrect answers 42 (6.06%) students had given correct reasoning while 651 (93.94%) students had given incorrect reasoning. Out of 42 (6.06%) students who had given correct reasoning, 23 (54.76%) students considered books as their primary source of knowledge followed by teachers-16 (38.10%), peers-1 (2.38%), parents-1 (2.38%) and observation/experience-1 (2.38%). Out of 651 (93.94 %) students who had given incorrect reasoning, 512 (78.65%) students considered books as their primary source of knowledge followed by teachers-104 (15.98%), peers-25 (3.84%), parents-2 (0.31%) and observation/experience-8 (1.23%).

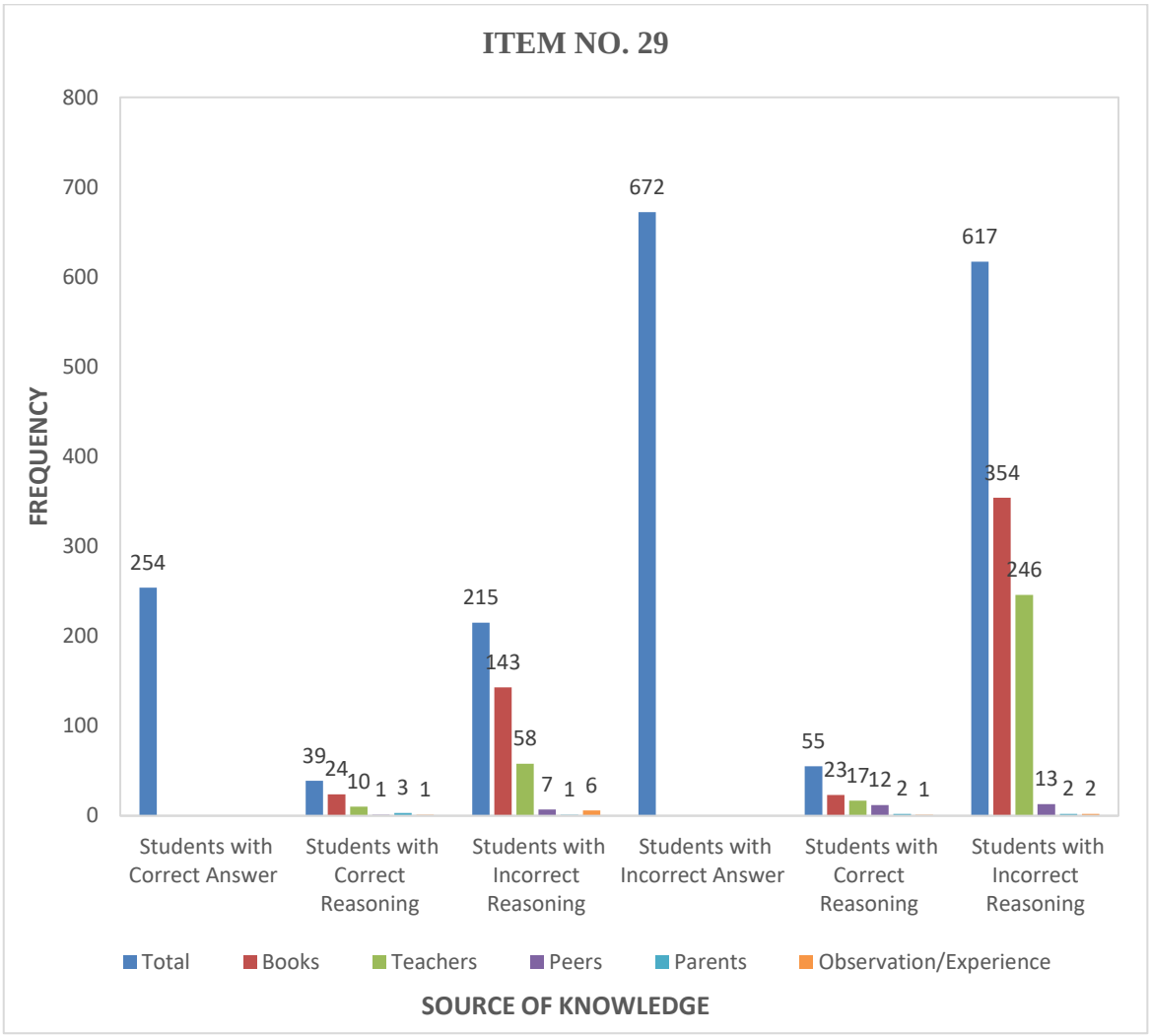
Out of 926 students 701 (75.70%) students considered books as their primary source of knowledge followed by teachers 170 (18.35%), peers 31 (3.34%), parents 9 (0.97%) and observations/experiences 15 (1.61%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 28 (3.02%) students had complete understanding of concept, 247 (26.67%) students had partial understanding of concept and 580 (70.30%) students had complete misunderstanding of concept or misconception.

Table_4.33 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 29	Gallium can melt when placed on the palm of your hand.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	254(27.40)	39(15.35)	215(84.65)	672(72.60)	55(8.18)	617(91.82)
Source of Knowledge						
Books		24(61.54)	143(66.51)		23(41.82)	354(57.37)
Teachers		10 (25.64)	58(26.98)		17 (30.91)	246(39.87)
Peers		1(2.56)	7(3.26)		12(21.82)	13(2.11)
Parents		3(7.69)	1(0.47)		2(3.64)	2(0.32)
Observation /Experience		1(2.56)	6(2.79)		1(1.82)	2(0.32)

Graph_4.33 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.33 it is evident that regarding item No. 29 out of 926 students 254 (27.40%) students had given correct answers. Out of 254 (27.40%) students who had given correct answers 39 (15.35%) students had given correct reasoning while 215 (84.65%) students had given incorrect reasoning. Out of 39 (15.35%) students who had given correct reasoning 24 (61.54%) students considered books as their primary source of knowledge followed by teachers-10 (25.64%), peers-1 (2.56%), parents-3 (7.69%) and observation/experience-1 (2.56%). Out of 215 (84.65%) students who had given incorrect reasoning 143 (66.51%) students considered books as their primary source of knowledge followed by teachers-58 (26.98%), peers-7 (3.26%), parents-1 (0.47%) and observation/experience-6 (2.79%).

While out of 926 students 672 (72.60%) students had given incorrect answers. Out of 672 (72.60%) students who had given incorrect answers 55 (8.18%) students had given correct reasoning while 617 (91.82%) students had given incorrect reasoning. Out of 55 students who had given correct reasoning, 23(41.82%) students considered books as their primary source of knowledge followed by teachers-17 (30.91%), peers-12 (21.82 %), parents-2 (3.64%) and observation/experience-1 (1.82%). Out of 617 (91.82%) students who had given incorrect reasoning, 354 (57.37%) students considered books as their primary source of knowledge followed by teachers-246 (39.87%), peers-13 (2.11 %) parents-2 (0.32%) and observation/experience-2 (0.32%).

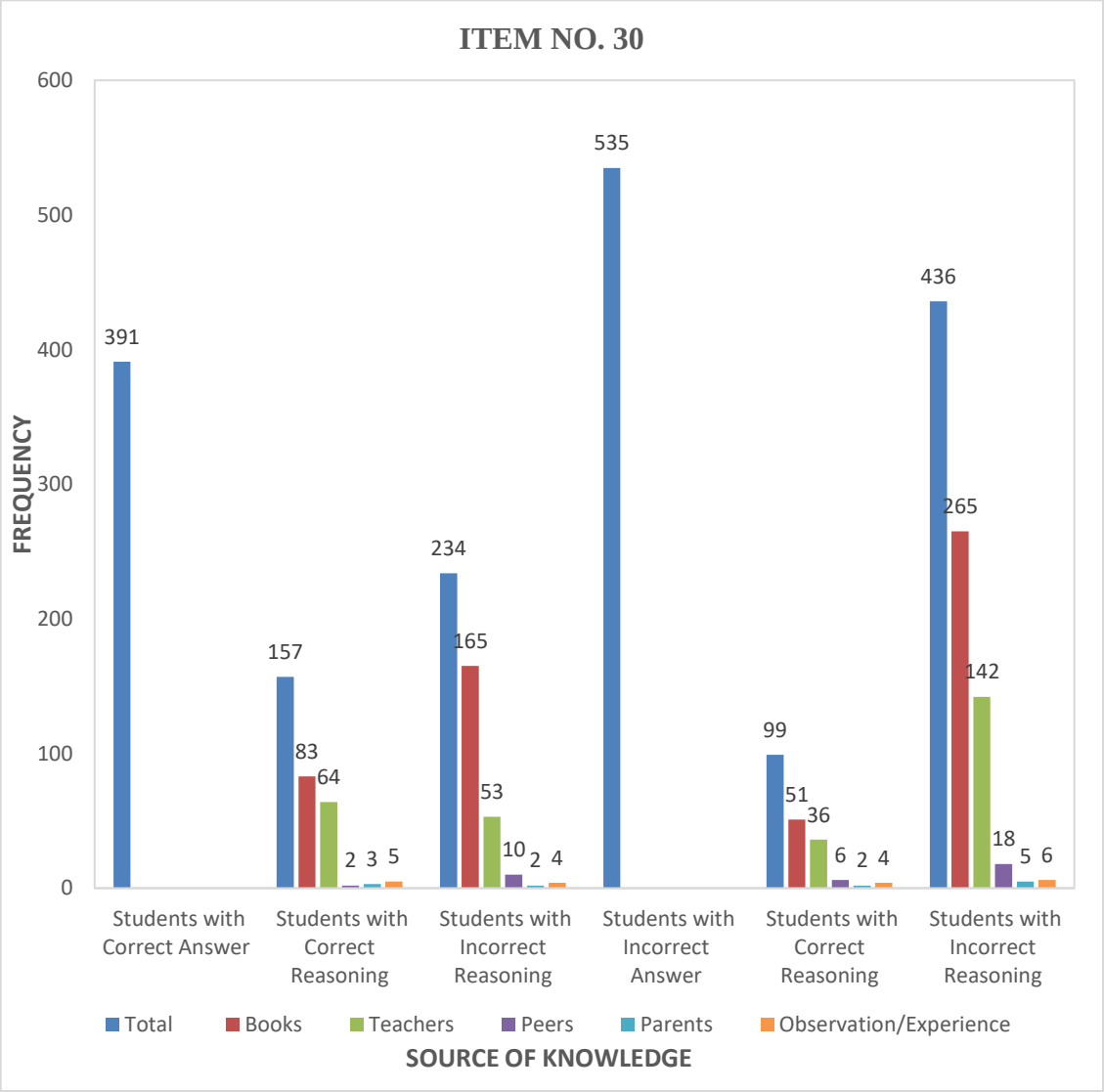
Out of 926 students 544 (58.74%) students considered books as their primary source of knowledge followed by teachers 331 (35.74%), peers 33 (3.56%), parents 8 (0.86%) and observations/experiences 10 (1.07%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 39 (4.21%) students had complete understanding of concept, 270 (29.15%) students had partial understanding of concept and 617 (66.64%) students had complete misunderstanding of concept or misconception.

Table_4.34 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 30	Iron, aluminium and magnesium do not react with oxygen.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	391(42.20)	157(40.15)	234(59.84)	535(57.80)	99(18.50)	436(81.50)
Source of Knowledge						
Books		83(52.87)	165(70.51)		51(51.52)	265(60.78)
Teachers		64(40.76)	53(22.65)		36(36.36)	142(32.57)
Peers		2(1.27)	10(4.27)		6(6.06)	18(4.13)
Parents		3(1.91)	2(0.85)		2(2.02)	5(1.15)
Observation /Experience		5(3.18)	4(1.71)		4(4.04)	6(1.38)

Graph_4.34 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.34 it is evident that regarding item No. 30 out of 926 students 391 (42.20%) students had given correct answers. Out of 391 (42.20%) students who had given correct answers 157 (40.15%) students had given correct reasoning while 234 (59.84%) students had given incorrect reasoning. Out of 157 (40.15%) students who had given correct reasoning 83 (52.87%) students considered books as their primary source of knowledge followed by teachers-64 (40.76%), peers-2 (1.27%), parents-3 (1.91%) and observation/experience-5 (3.18%). Out of 234 (59.84%) students who had given incorrect reasoning 165 (70.51%) students considered books as their primary source of knowledge followed by teachers-53 (22.65%), peers-10 (4.27%), parents-2 (0.85%) and observation/experience-4 (1.71%).

While out of 926 students 535 (57.80%) students had given incorrect answers. Out of 535 (57.80%) students who had given incorrect answers 99 (18.50%) students had given correct reasoning while 436 (81.50%) students had given incorrect reasoning. Out of 99 (18.50%) students who had given correct reasoning, 51 (51.52%) students considered books as their primary source of knowledge followed by teachers-36 (36.36%), peers-6 (6.06%), parents-2 (2.02%) and observation/experience-4 (4.04%). Out of 436 (81.50 %) students who had given incorrect reasoning, 265 (60.78%) students considered books as their primary source of knowledge followed by teachers-142 (32.37%), peers-18 (4.13%), parents-5 (1.15 %) and observation/experience-6 (1.38%).

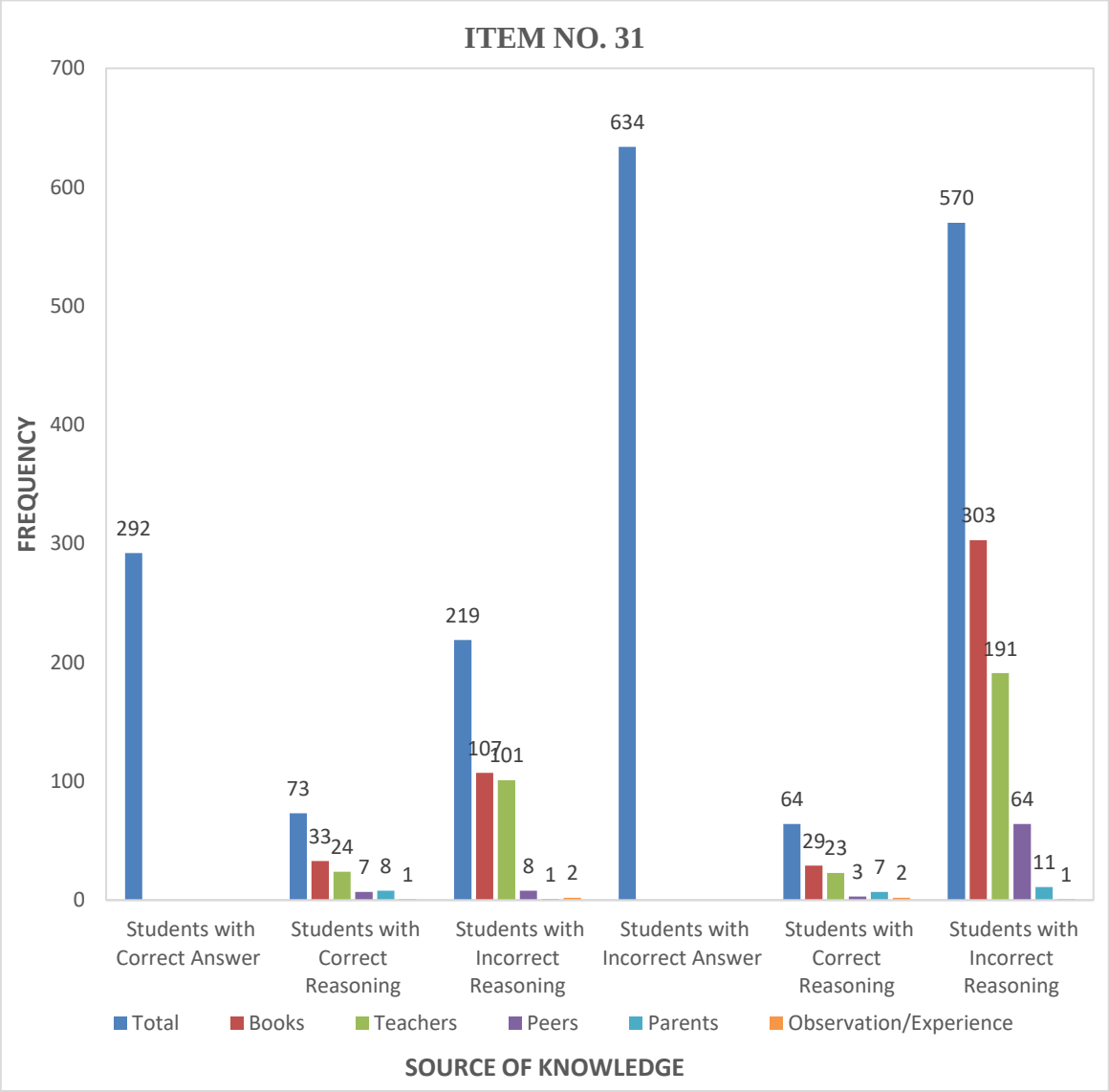
Out of 926 students 564 (60.90%) students considered books as their primary source of knowledge followed by teachers 295 (31.85%), peers 36 (3.88 %), parents 12 (1.29%) and observations/experiences 19 (2.05%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 157 (16.95%) students had complete understanding of concept, 333 (35.97%) students had partial understanding of concept and 436 (47.08%) students had complete misunderstanding of concept or misconception.

Table_4.35 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 31	**Coal is a metal.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & (%) of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**292(31.50)**	**73(25.00)**	**219(75.00)**	**634(68.50)**	**64(10.09)**	**570(89.91)**
Source of Knowledge						
Books		**33(45.21)**	**107(48.86)**		**29(45.31)**	**303(53.16)**
Teachers		**24(32.88)**	**101(46.12)**		**23(35.94)**	**191(33.51)**
Peers		**7(9.59)**	**8(3.65)**		**3(4.69)**	**64(11.23)**
Parents		**8(10.96)**	**1(0.46)**		**7(10.94)**	**11(1.93)**
Observation /Experience		**1(1.37)**	**2(0.91)**		**2(3.13)**	**1(0.18)**

Graph_4.35 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.35 it is evident that regarding item No. 31 out of 926 students 292 (31.50%) students had given correct answers. Out of 292 (31.50%) students who had given correct answers 73(25%) students had given correct reasoning while 219 (75%) students had given incorrect reasoning. Out of 73(25%) students who had given correct reasoning 33 (45.21%) students considered books as their primary source of knowledge followed by teachers-24 (32.88%), peers-7 (9.59%), parents-8 (10.96%) and observation/experience-1 (1.37%). Out of 219 (75 %) students who had given incorrect reasoning 107 (48.66%) students considered books as their primary source of knowledge followed by teachers-101 (46.12%), peers-8 (3.65%), parents-1 (0.46%) and observation/experience-2 (0.91%).

While out of 926 students 634 (68.50%) students had given incorrect answers. Out of 634 (68.50%) students who had given incorrect answers 64 (10.09%) students had given correct reasoning while 570 (89.91%) students had given incorrect reasoning. Out of 64 students who had given correct reasoning, 29 (45.31%) students considered books as their primary source of knowledge followed by teachers-23 (35.94%), peers-3 (4.69%), parents-7 (10.94%) and observation/experience-2 (3.13%). Out of 570 (89.91%) students who had given incorrect reasoning, 303 (53.16%) students considered books as their primary source of knowledge followed by teachers-191 (33.51%), peers-64 (11.23 %), parents-11 (1.93%), and observation/experience-1 (0.18%).

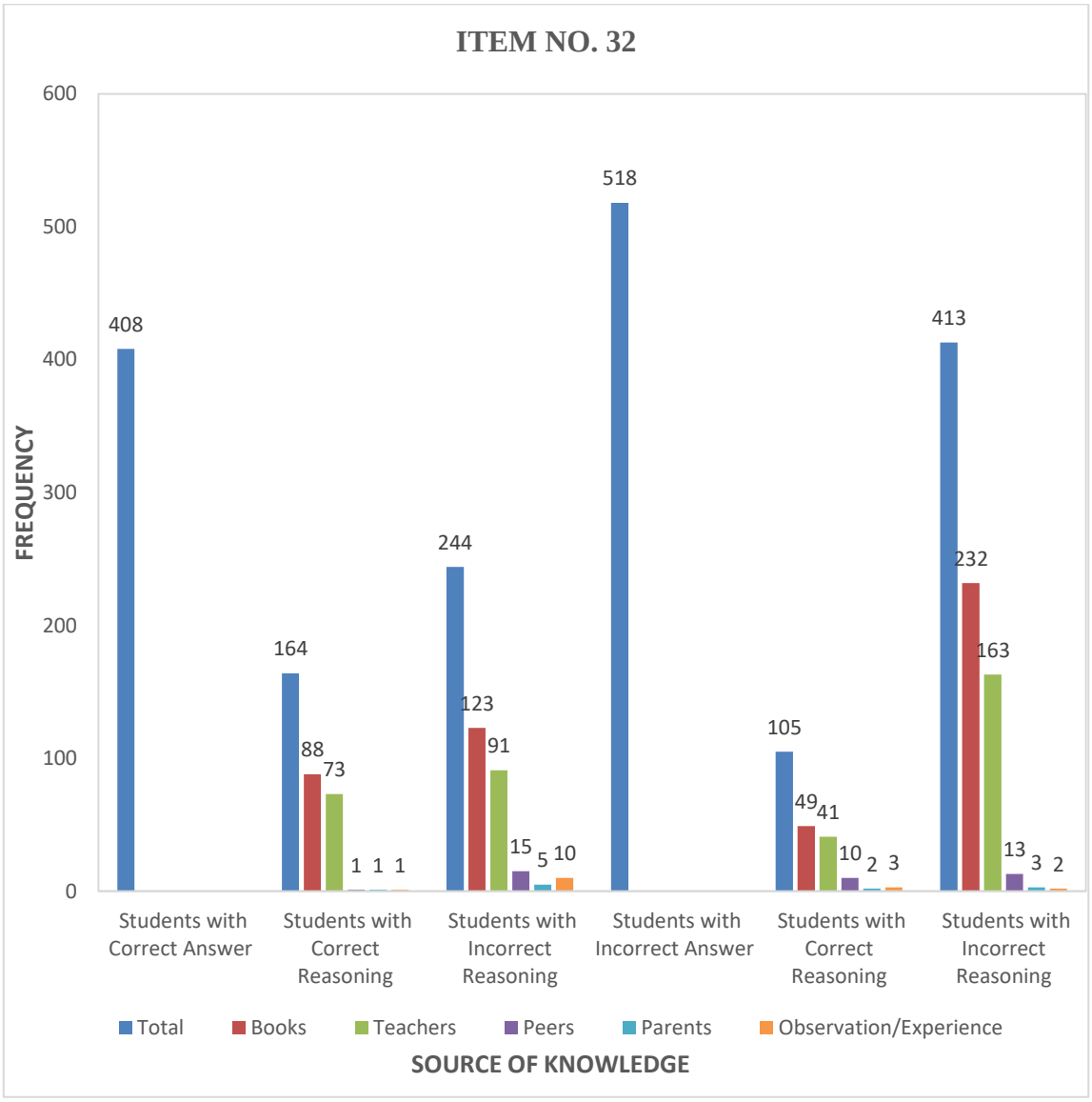
Out of 926 students 472 (50.97%) students considered books as their primary source of knowledge followed by teachers 339 (36.60%), peers 82 (8.85%), parents 27 (2.91%) and observations/experiences 6 (0.64%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 73 (7.89%) students had complete understanding of concept, 283 (30.56%) students had partial understanding of concept and 570 (61.55%) students had complete misunderstanding of concept or misconception.

Table_4. 36 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 32	Zinc is used for coating of food cans rather than tin.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	408(44.10)	164(40.19)	244(59.81)	518(55.90)	105(20.27)	413(79.73)
Source of Knowledge						
Books		88(53.66)	123(50.41)		49(46.67)	232(56.17)
Teachers		73(44.51)	91(37.30)		41(39.05)	163(39.47)
Peers		1(0.61)	15(6.15)		10(9.52)	13(3.15)
Parents		1(0.61)	5(2.05)		2(1.90)	3(0.73)
Observation /Experience		1(0.61)	10(4.10)		3(2.86)	2(0.48)

Graph_4.36 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.36 it is evident that regarding item No. 32 out of 926 students 408 (44.10 %) students had given correct answers. Out of 408 (44.10%) students who had given correct answers 164 (40.19%) students had given correct reasoning while 244 (59.81%) students had given incorrect reasoning. Out of 164 (40.19%) students who had given correct reasoning 88 (53.66%) students considered books as their primary source of knowledge followed by teachers-73 (44.51%), peers-1 (0.61%), parents-1 (0.61%) and observation/experience-1 (0.61%). Out of 244 (59.81%) students who had given incorrect reasoning 123 (50.41%) students considered books as their primary source of knowledge followed by teachers-91 (37.30%), peers-15 (6.15%), parents-5 (2.05%) and observation/experience-10 (4.10%).

While out of 926 students 518 (55.90%) students had given incorrect answers. Out of 518 (55.90%) students who had given incorrect answers 105 (20.27%) students had given correct reasoning while 413 (79.73%) students had given incorrect reasoning. Out of 105 (20.27%) students who had given correct reasoning, 49 (46.67%) students considered books as their primary source of knowledge followed by teachers-41 (39.05 %), peers-10 (9.52%), parents-2 (1.90%) and observation/experience-3 (2.86%). Out of 413 (79.73%) students who had given incorrect reasoning, 232 (56.17%) students considered books as their primary source of knowledge followed by teachers-163 (39.47 %), peers-13 (3.15%), parents-3 (0.73%) and observation/experience-2 (0.48%).

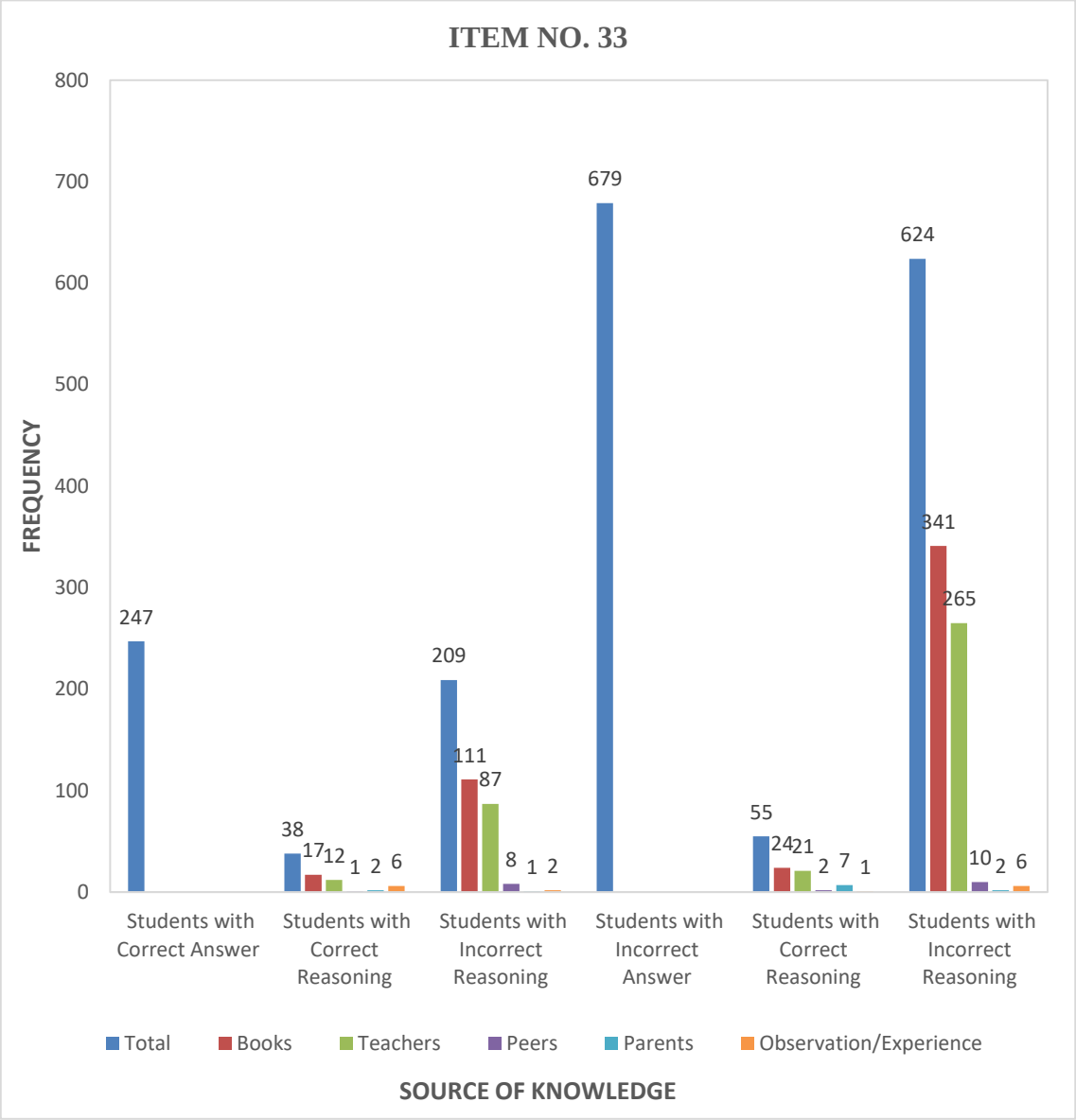
Out of 926 students 492 (53.13%) students considered books as their primary source of knowledge followed by teachers 368 (39.74%), peers 39 (4.21%), parents 11 (1.18%) and observations/experiences 16 (1.72%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 164 (17.71%) students had complete understanding of concept, 349 (37.68%) students had partial understanding of concept and 413 (44.61%) students had complete misunderstanding of concept or misconception.

Table_4.37 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 33	Diamond is a non-metal.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	247(26.70)	38(15.38)	209(84.62)	679(73.30)	55(8.10)	624(91.90)
Source of Knowledge						
Books		17(44.74)	111(53.11)		24(43.64)	341(54.65)
Teachers		12(31.58)	87(41.63)		21(38.18)	265(42.47)
Peers		1(2.63)	8(3.83)		2(3.64)	10(1.60)
Parents		2(5.26)	1(0.48)		7(12.73)	2(0.32)
Observation /Experience		6(15.79)	2(0.96)		1(1.82)	6(0.96)

Graph_4.37 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.37 it is evident that regarding item No. 33 out of 926 students 247 (26.70 %) students had given correct answers. Out of 247 (26.70%) students who had given correct answers 38(15.38%) students had given correct reasoning while 209 (84.62%) students had given incorrect reasoning. Out of 38 (15.38%) students who had given correct reasoning 17 (44.74%) students considered books as their primary source of knowledge followed by teachers-12 (31.58%), peers-1 (2.63%), parents-2 (5.26%) and observation/experience-6 (15.79%). Out of 209 (84.62%) students who had given incorrect reasoning 111 (53.11%) students considered books as their primary source of knowledge followed by teachers-87 (41.63%), peers-8 (3.83%), parents-1 (0.48%) and observation/experience-2 (0.96%).

While out of 926 students 679 (73.30%) students had given incorrect answers. Out of 679 (73.30%) students who had given incorrect answers 55 (8.10%) students had given correct reasoning while 624 (91.90%) students had given incorrect reasoning. Out of 55 (8.10%) students who had given correct reasoning, 24 (43.64 %) students considered books as their primary source of knowledge followed by teachers-21 (38.18%), peers-2 (3.64%), parents-7 (12.73%) and observation/experience-1 (1.82%). Out of 624 (91.90 %) students who had given incorrect reasoning, 341(54.65%) students considered books as their primary source of knowledge followed by teachers-265 (42.47%), peers-10 (1.60%), parents-2 (0.32%) and observation/experience-6 (0.96%).

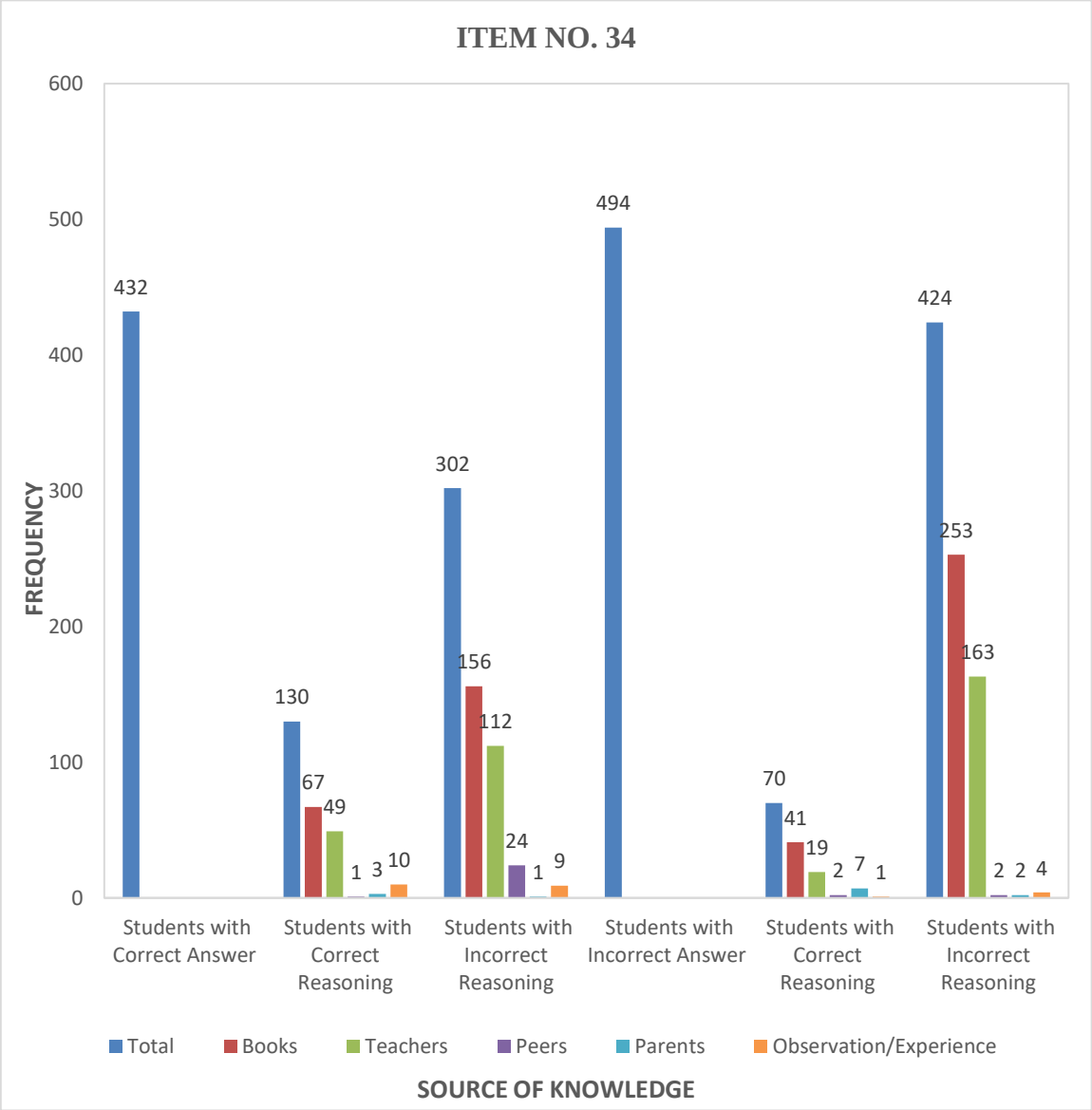
Out of 926 students 493 (53.23%) students considered books as their primary source of knowledge followed by teachers 385 (41.57%), peers 21 (2.26%), parents 12 (1.29%) and observations/experiences 15 (1.61%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 38 (4.11%) students had complete understanding of concept, 264 (28.50%) students had partial understanding of concept and 624 (91.90%) students had complete misunderstanding of concept or misconception.

Table_4.38 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 34	Iron gets converted to its sulphide during the process of rusting.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	432(46.70)	130(30.09)	302(69.91)	494(53.30)	70(14.17)	424(85.83)
Source of Knowledge						
Books		67(51.54)	156(51.66)		41(58.57)	253(59.67)
Teachers		49(37.69)	112(37.09)		19(27.14)	163(38.44)
Peers		1(0.77)	24(7.95)		2(2.86)	2(0.47)
Parents		3(2.31)	1(0.33)		7(10.00)	2(0.47)
Observation /Experience		10(7.69)	9(2.98)		1(1.43)	4(0.94)

Graph_4.38 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.38 it is evident that regarding item No. 34 out of 926 students 432 (46.70 %) students had given correct answers. Out of 432 (46.70%) students who had given correct answers 130 (30.09%) students had given correct reasoning while 302 (69.91%) students had given incorrect reasoning. Out of 130 (30.09%) students who had given correct reasoning 67 (51.54%) students considered books as their primary source of knowledge followed by teachers-49 (37.69%) peers-1 (0.77%), parents-3 (2.31%) and observation/experience-10 (7.69%). Out of 302 (69.91%) students who had given incorrect reasoning 156 (51.66%) students considered books as their primary source of knowledge followed by teachers-112 (37.09%), peers-24 (7.95%), parents-1 (0.33%) and observation/experience-9 (2.98%).

While out of 926 students 494 (53.30%) students had given incorrect answers. Out of 494 (53.30%) students who had given incorrect answers 70 (14.17%) students had given correct reasoning while 424 (85.83%) students had given incorrect reasoning. Out of 70 (14.17%) students who had given correct reasoning, 41 (58.57%) students considered books as their primary source of knowledge followed by teachers-19 (27.14%), peers-2 (2.86%), parents-7 (10%) and observation/experience-1 (1.43%). Out of 424 (85.83%) students who had given incorrect reasoning, 253 (59.67%) students considered books as their primary source of knowledge followed by teachers-163 (38.44%), peers-2 (0.47 %), parents-2 (0.47%) and observation/experience-4 (0.94%).

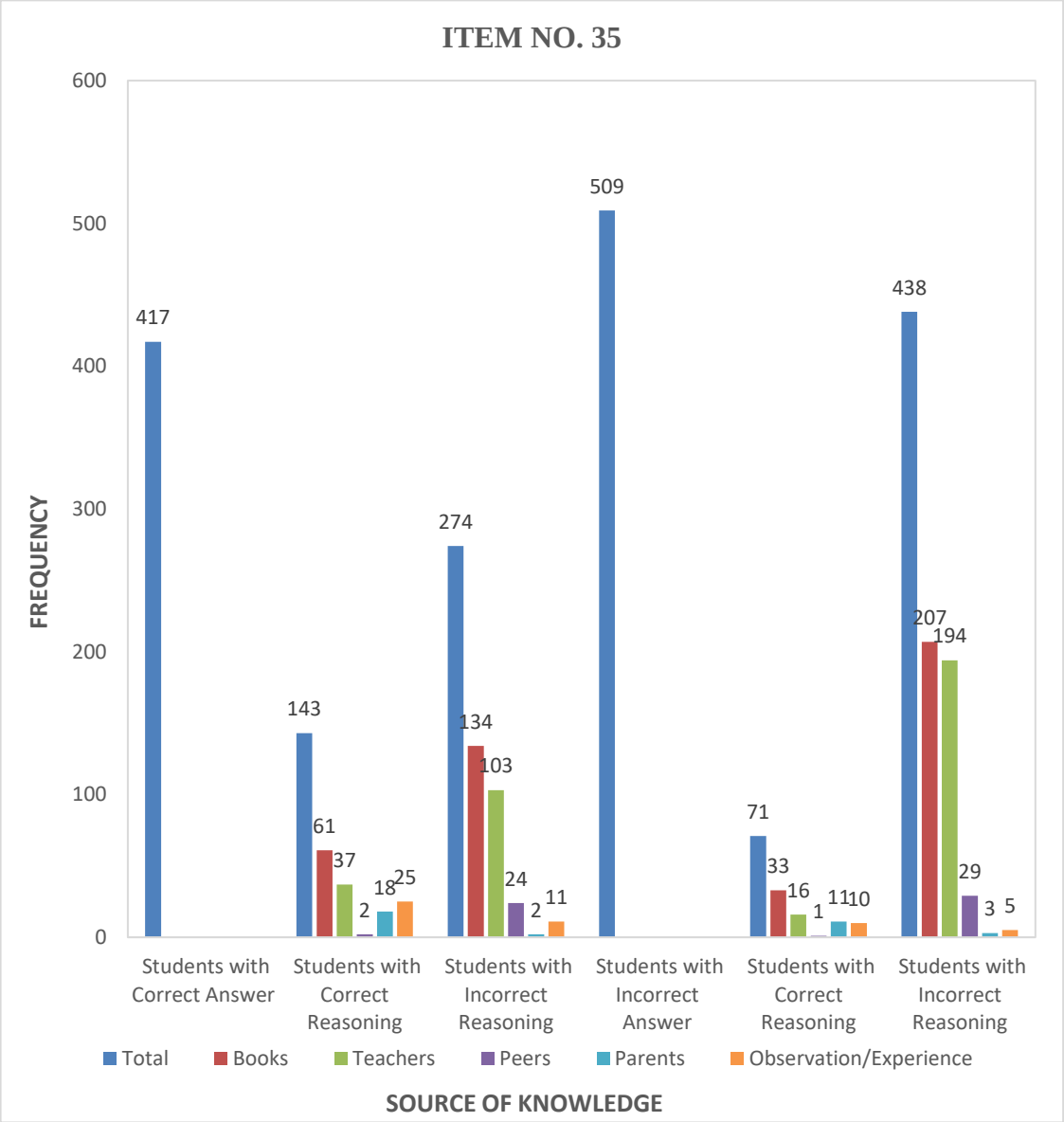
Out of 926 students 517 (5.83%) students considered books as their primary source of knowledge followed by teachers 343 (37.04%), peers 29 (3.13%), parents 13 (1.40%) and observations/experiences 24 (2.59%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 130 (14.03%) students had complete understanding of concept, 372 (40.18%) students had partial understanding of concept and 424 (45.79%) students had complete misunderstanding of concept or misconception.

Table_4.39 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 35	Cooking vessels are never made up of lead.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	417(45.00)	143(34.29)	274(65.71)	509(55.00)	71(13.94)	438(86.59)
Source of Knowledge						
Books		61(42.66)	134(48.91)		33(46.48)	207(47.26)
Teachers		37(25.87)	103(37.59)		16(22.54)	194(44.29)
Peers		2(1.40)	24(8.76)		1(1.41)	29(6.62)
Parents		18(12.59)	2(0.73)		11(15.49)	3(0.68)
Observation /Experience		25(17.48)	11(4.01)		10(14.08)	5(1.14)

Graph_4.39 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.39 it is evident that regarding item No. 35 out of 926 students 417(45%) students had given correct answers. Out of 417 (45%) students who had given correct answers 143 (34.29%) students had given correct reasoning while 274 (65.71%) students had given incorrect reasoning. Out of 143 (34.29%) students who had given correct reasoning 61 (42.66%) students considered books as their primary source of knowledge followed by teachers-37 (25.87%) peers-2 (1.40%), parents-18 (12.59%) and observation/experience-25 (17.48%). Out of 274 (65.71%) students who had given incorrect reasoning 134 (48.91%) students considered books as their primary source of knowledge followed by teachers-103 (37.59%), peers-24 (8.76%), parents-2 (0.73%) and observation/experience-11 (4.01%).

While out of 926 students 509 (55%) students had given incorrect answers. Out of 509 (55%) students who had given incorrect answers 71 (13.94%) students had given correct reasoning while 438 (86.59%) students had given incorrect reasoning. Out of 71 (13.94 %) students who had given correct reasoning, 33 (46.48%) students considered books as their primary source of knowledge followed by teachers-16 (22.54%), peers-1 (1.41%), parents-11 (15.49%) and observation/experience-10 (14.08%). Out of 438 (86.59%) students who had given incorrect reasoning, 207 (47.26%) students considered books as their primary source of knowledge followed by teachers-194 (44.29%), peers-29 (6.62 %), parents-3 (0.68%) and observation/experience-5 (1.14%).

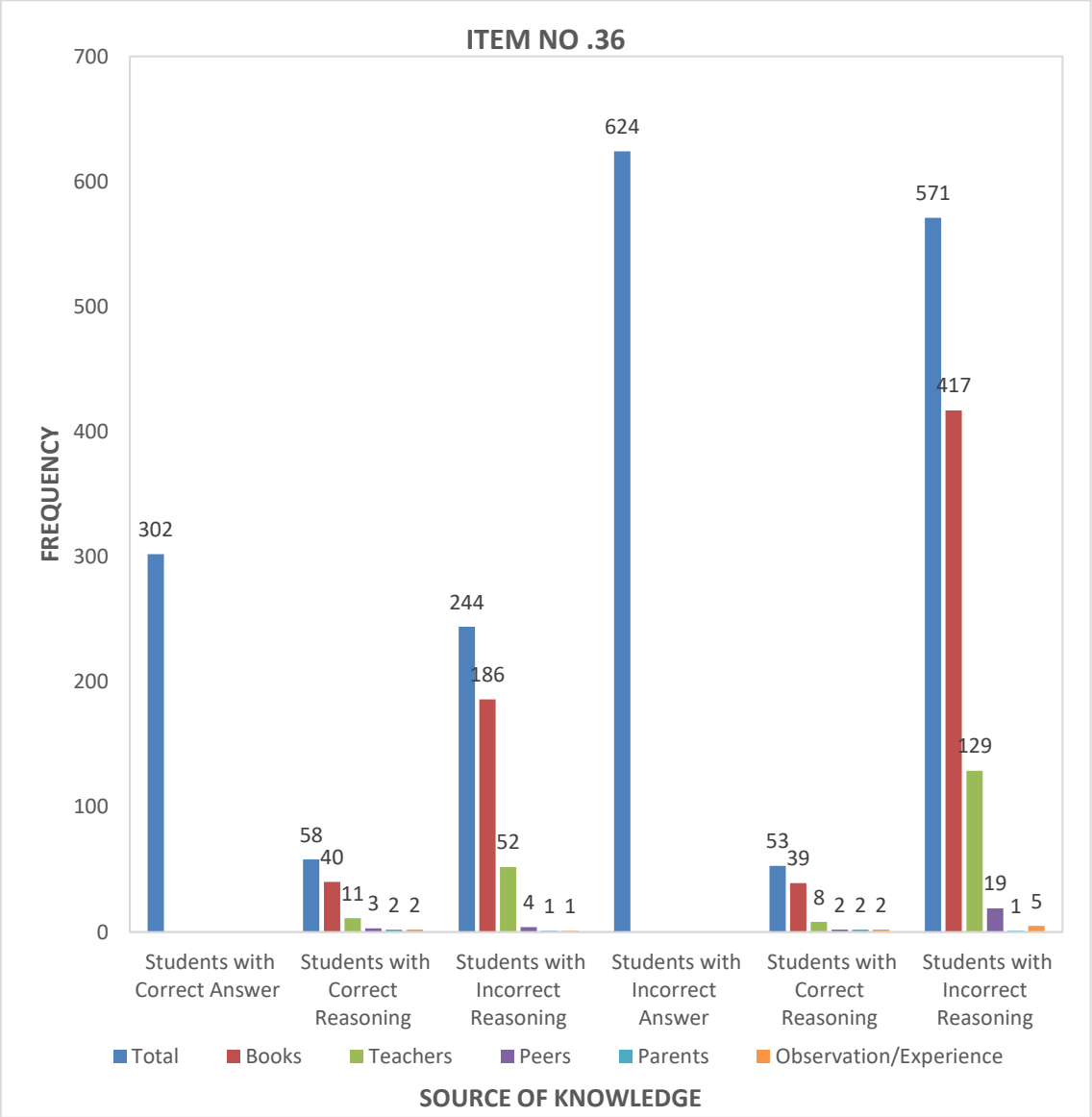
Out of 926 students 435 (46.97%) students considered books as their primary source of knowledge followed by teachers 350 (37.79%), peers 56 (6.04%), parents 34 (3.67%) and observations/experiences 51 (5.50%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 143 (15.43%) students had complete understanding of concept, 345 (37.25%) students had partial understanding of concept and 438 (47.30%) students had complete misunderstanding of concept or misconception.

Table_4.40 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 36	Non-metallic oxides are basic in nature.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	302(32.60)	58(19.20)	244(80.80)	624(67.40)	53(8.49)	571(91.51)
Source of Knowledge						
Books		40(68.97)	186(76.23)		39(73.58)	417(73.03)
Teachers		11(18.97)	52(21.31)		8(15.09)	129(22.59)
Peers		3(5.17)	4(1.64)		2(3.77)	19(3.33)
Parents		2(3.45)	1(0.41)		2 (3.77)	1(0.81)
Observation /Experience		2(3.45)	1(0.41)		2(3.77)	5(0.88)

Graph_4.40 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.40 it is evident that regarding item No. 36 out of 926 students 302 (32.60%) students had given correct answers. Out of 302 (32.60%) students who had given correct answers 58 (19.20%) students had given correct reasoning while 244 (80.80%) students had given incorrect reasoning. Out of 58 (19.20%) students who had given correct reasoning 40 (68.97%) students considered books as their primary source of knowledge followed by teachers-11 (18.97%) peers-3 (5.17%), parents-2 (3.45%) and observation/experience-2 (3.45%). Out of 244 (80.80%) students who had given incorrect reasoning 186 (76.23%) students considered books as their primary source of knowledge followed by teachers-52 (21.31%), peers-4 (1.64%), parents-1(0.41%) and observation/experience-1 (0.41%).

While out of 926 students 624 (67.40%) students had given incorrect answers. Out of 624 (67.40%) students who had given incorrect answers 53 (8.49%) students had given correct reasoning while 571 (91.51%) students had given incorrect reasoning. Out of 53 (8.49%) students who had given correct reasoning, 39 (73.58%) students considered books as their primary source of knowledge followed by teachers-8 (15.09%), peers-2 (3.77%), parents-2 (3.77%) and observation/experience-2 (3.77%). Out of 571 (91.51 %) students who had given incorrect reasoning, 417 (73.03%) students considered books as their primary source of knowledge followed by teachers-129 (22.59%), peers-19 (3.33%), parents-1 (0.81%) and observation/experience-5 (0.88%).

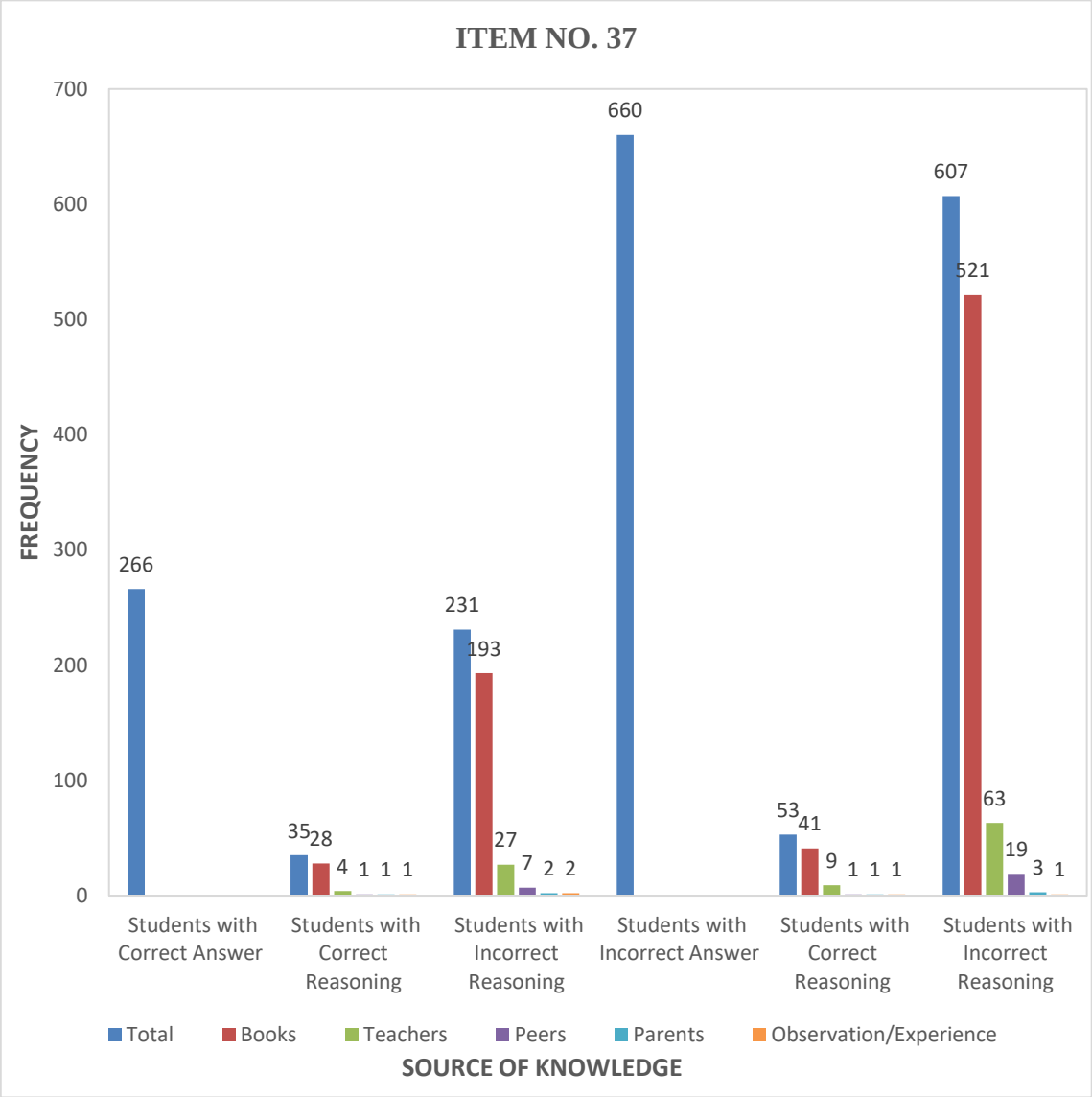
Out of 926 students 682 (73.65%) students considered books as their primary source of knowledge followed by teachers 200 (21.59%), peers 28 (3.02%), parents 6 (0.64%) and observations/experiences 10 (1.07%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 58 (6.26%) students had complete understanding of concept, 297 (32.08%) students had partial understanding of concept and 571 (61.66%) students had complete misunderstanding of concept or misconception.

Table_4.41 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 37	Sodium can be easily stored at room temperature.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	266(28.70)	35(13.15)	231(86.85)	660(71.30)	53(8.04)	607(91.96)
Source of Knowledge						
Books		28(80.00)	193(83.55)		41(77.39)	521(85.83)
Teachers		4(11.43)	27(11.69)		9(16.98)	63(10.38)
Peers		1(2.86)	7(3.03)		1(1.89)	19(3.13)
Parents		1(2.86)	2(0.87)		1(1.89)	3(0.49)
Observation /Experience		1(2.86)	2(0.87)		1(1.89)	1(0.16)

Graph_4.41 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.41 it is evident that regarding item No. 37 out of 926 students 266 (28.70%) students had given correct answers. Out of 266 (28.70%) students who had given correct answers 35 (13.15%) students had given correct reasoning while 231 (86.85%) students had given incorrect reasoning. Out of 35 (13.15%) students who had given correct reasoning 28 (80%) students considered books as their primary source of knowledge followed by teachers-4 (11.43%) peers-1 (2.86%), parents-1 (2.86%) and observation/experience-1 (2.86%). Out of 231 (86.85%) students who had given incorrect reasoning 193 (83.55%) students considered books as their primary source of knowledge followed by teachers-27 (11.69%), peers-7 (3.03%), parents-2 (0.87%) and observation/experience-2 (0.87%).

While out of 926 students 660 (71.30%) students had given incorrect answers. Out of 660 (71.30%) students who had given incorrect answers 53 (8.04%) students had given correct reasoning while 607 (91.96%) students had given incorrect reasoning. Out of 53 (8.04%) students who had given correct reasoning, 41(77.39%) students considered books as their primary source of knowledge followed by teachers-9 (16.98%), peers-1(1.89%), parents-1 (1.89%) and observation/experience-1 (1.89%). Out of 607 (91.96 %) students who had given incorrect reasoning, 521 (85.83%) students considered books as their primary source of knowledge followed by teachers-63 (10.38%), peers-19 (3.13%), parents-3 (0.49%) and observation/experience-1 (0.16%).

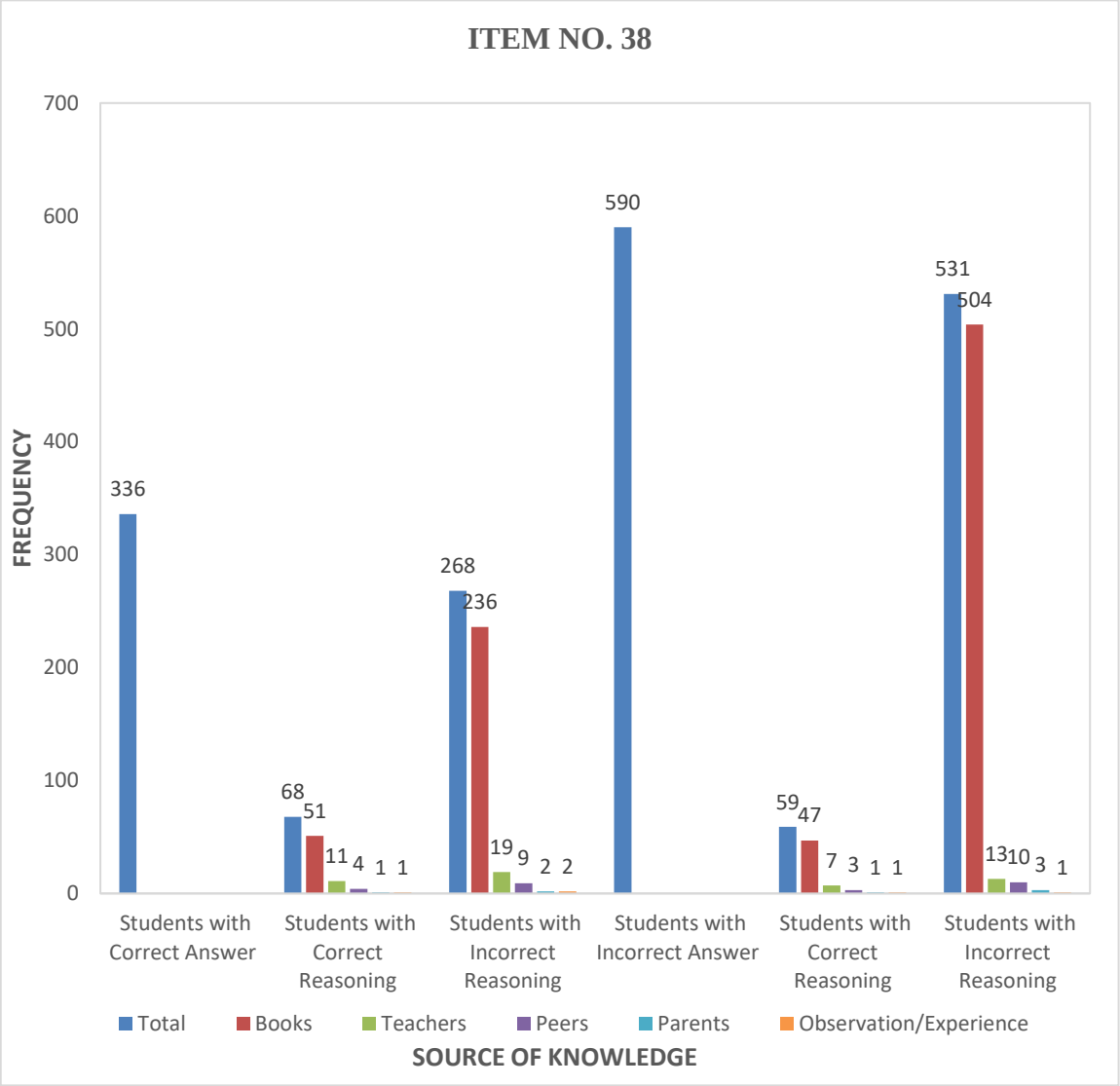
Out of 926 students 783 (84.55%) students considered books as their primary source of knowledge followed by teachers 103 (11.12%), peers 28 (3.02%), parents 7 (0.75%) and observations/experiences 5 (0.53%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 35 (3.77%) students had complete understanding of concept, 284 (30.67%) students had partial understanding of concept and 607 (65.56%) students had complete misunderstanding of concept or misconception.

Table_4.42 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 38	White phosphorous is generally stored in water.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	336(36.30)	68(20.23)	268(79.77)	590(63.70)	59(10.00)	531(90.00)
Source of Knowledge						
Books		51(75.00)	236(88.06)		47(79.66)	504(94.92)
Teachers		11(16.18)	19(7.09)		7(11.86)	13(2.45)
Peers		4(5.88)	9(3.36)		3(5.08)	10(1.88)
Parents		1(1.47)	2(0.75)		1(1.69)	3(0.56)
Observation /Experience		1(1.47)	2(0.75)		1(1.69)	1(0.19)

Graph_4.42 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.42 it is evident that regarding item No. 38 out of 926 students 336 (36.30 %) students had given correct answers. Out of 336 (36.30%) students who had given correct answers 68 (20.23%) students had given correct reasoning while 268 (79.77%) students had given incorrect reasoning. Out of 68 (20.23%) students who had given correct reasoning 51 (75%) students considered books as their primary source of knowledge followed by teachers-11 (16.18%), peers-4 (5.88%), parents-1(1.47%) and observation/experience-1 (1.47%). Out of 268 (79.77%) students who had given incorrect reasoning 236 (88.06%) students considered books as their primary source of knowledge followed by teachers-19 (7.09%), peers-9 (3.36%), parents-2 (0.75%) and observation/experience-2 (0.75%).

While out of 926 students 590 (63.70%) students had given incorrect answers. Out of 590 (63.70%) students who had given incorrect answers 59 (10%) students had given correct reasoning while 513 (90%) students had given incorrect reasoning. Out of 59 (10%) students who had given correct reasoning, 47 (79.66%) students considered books as their primary source of knowledge followed by teachers-7 (11.86%), peers-3 (5.08%), parents-1 (1.69%) and observation/experience-1 (1.69%). Out of 531 (90%) students who had given incorrect reasoning, 504 (94.92%) students considered books as their primary source of knowledge followed by teachers-13 (2.45%), peers-10 (1.88%), parents-3 (0.56%) and observation/experience-1 (0.19%).

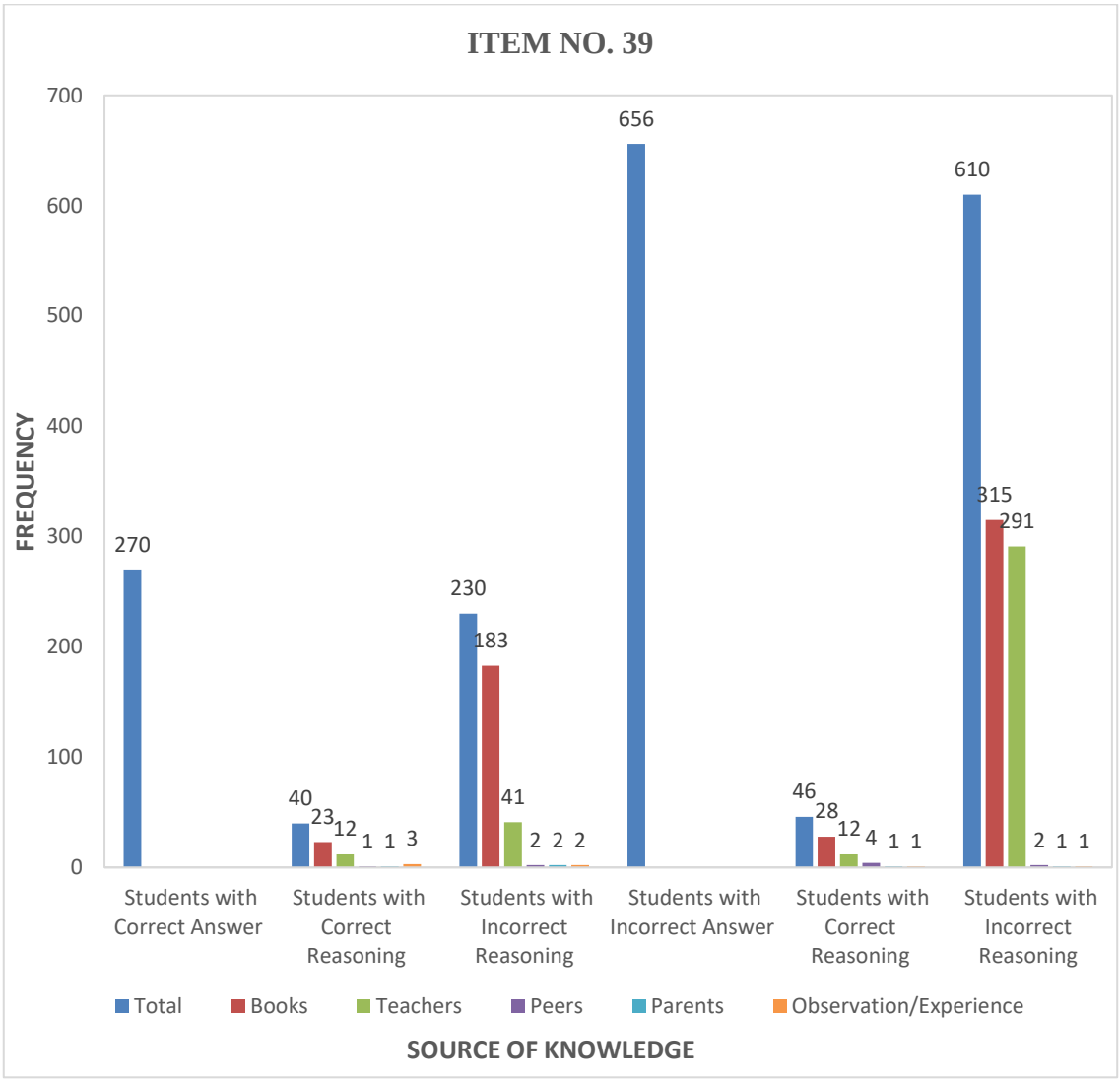
Out of 926 students 838 (90.49%) students considered books as their primary source of knowledge followed by teachers 50 (5.39%), peers 26 (2.80%), parents 7 (0.75%) and observations/experiences 5 (0.53%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 68 (7.34%) students had complete understanding of concept, 327 (35.31%) students had partial understanding of concept and 531 (57.34%) students had complete misunderstanding of concept or misconception.

Table_4.43 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 39	Non-metals are sonorous in nature.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	270(29.20)	40(14.81)	230(85.19)	656(70.80)	46(7.01)	610(92.99)
Source of Knowledge						
Books		23(57.50)	183(79.57)		28(60.87)	315(51.64)
Teachers		12(30.00)	41(17.83)		12(26.09)	291(47.70)
Peers		1(2.50)	2(0.87)		4(8.70)	2(0.33)
Parents		1(2.50)	2(0.87)		1(2.17)	1(0.16)
Observation /Experience		3(7.50)	2(0.87)		1(2.17)	1(0.16)

Graph_4.43 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.43 it is evident that regarding item No. 39 out of 926 students 270 (29.20%) students had given correct answers. Out of 270 (29.20%) students who had given correct answers 40 (14.81%) students had given correct reasoning while 230 (85.19%) students had given incorrect reasoning. Out of 40 (14.81%) students who had given correct reasoning 23 (57.50%) students considered books as their primary source of knowledge followed by teachers-12 (30%) peers-1 (2.50%), parents-1(2.50%) and observation/experience-3 (7.50%). Out of 230 (85.19%) students who had given incorrect reasoning 183 (79.57%) students considered books as their primary source of knowledge followed by teachers-41 (17.83%), peers-2 (0.87%), parents-2 (0.87%) and observation/experience-2 (0.87%).

While out of 926 students 656 (70.80%) students had given incorrect answers. Out of 656 (70.80%) students who had given incorrect answers 46 students had given correct reasoning while 610 (92.99 %) students had given incorrect reasoning. Out of 46 (7.01 %) students who had given correct reasoning, 28 (60.87%) students considered books as their primary source of knowledge followed by teachers-12 (26.09%), peers-4 (8.70%), parents-1 (2.17%) and observation/experience-1 (2.17%). Out of 610 (92.99%) students who had given incorrect reasoning, 315 (51.64%) students considered books as their primary source of knowledge followed by teachers-291 (47.70%), peers-2 (0.33%), parents-1 (0.16%) and observation/experience-1 (0.16%).

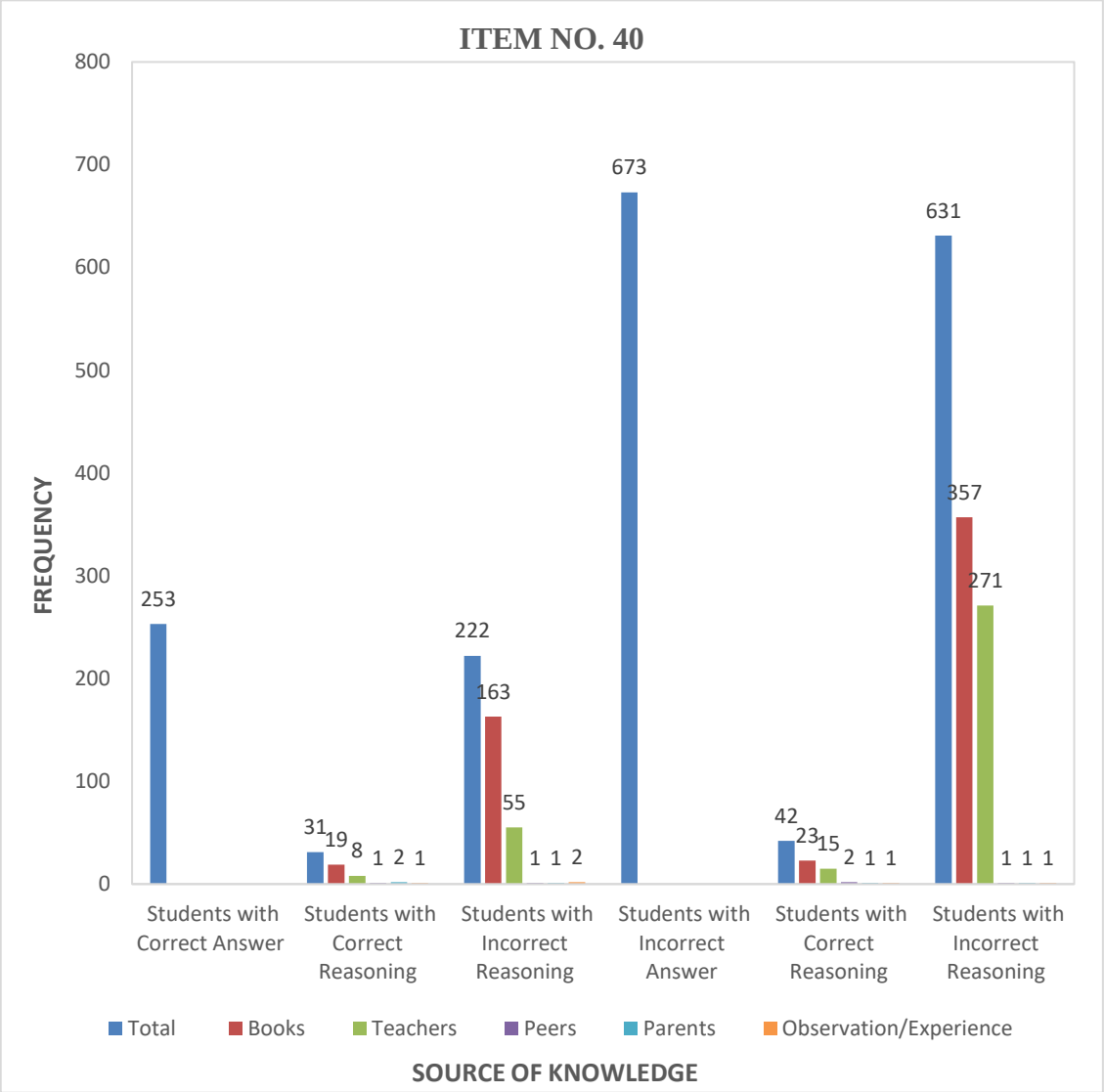
Out of 926 students 549 (59.28%) students considered books as their primary source of knowledge followed by teachers 356 (38.44%), peers 9 (0.97%), parents 5 (0.53%) and observations/experiences 7 (0.75%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 40 (4.32%) students had complete understanding of concept, 276 (29.80%) students had partial understanding of concept and 610 (65.88%) students had complete misunderstanding of concept or misconception.

Table_4.44 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 40	Mercury is used in thermometer because it is ductile.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	253(27.30)	31(12.25)	222(87.75)	673(72.70)	42(6.24)	631(93.76)
Source of Knowledge						
Books		19(61.29)	163(73.42)		23(54.76)	357(56.58)
Teachers		8(25.81)	55(24.77)		15(35.71)	271(42.95)
Peers		1(3.23)	1(0.45)		2(4.76)	1(0.16)
Parents		2(6.45)	1(0.45)		1(2.38)	1(0.16)
Observation /Experience		1(3.23)	2(0.90)		1(2.38)	1(0.16)

Graph_4.44 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.44 it is evident that regarding item No. 40 out of 926 students 253 (27.30%) students had given correct answers. Out of 253 (27.30%) students who had given correct answers 31 (12.25%) students had given correct reasoning while 222 (87.75%) students had given incorrect reasoning. Out of 31 (12.25%) students who had given correct reasoning 19 (61.29%) students considered books as their primary source of knowledge followed by teachers-8 (25.81%) peers-1 (3.23%), parents-2 (6.45%) and observation/experience-1 (3.23%). Out of 222 (87.75%) students who had given incorrect reasoning 163 (73.75%) students considered books as their primary source of knowledge followed by teachers-55 (24.77%), peers-1 (0.45%), parents-1 (0.45%) and observation/experience-2 (0.90%).

While out of 926 students 673 (72.70%) students had given incorrect answers. Out of 673 (72.70%) students who had given incorrect answers 42 (6.24%) students had given correct reasoning while 631 (93.76%) students had given incorrect reasoning. Out of 42 (6.24%) students who had given correct reasoning, 23 (54.76%) students considered books as their primary source of knowledge followed by teachers-15 (35.71%), peers-2 (4.76%), parents-1 (2.38%) and observation/experience-1 (2.38%). Out of 631 (93.76 %) students who had given incorrect reasoning, 357 (56.58%) students considered books as their primary source of knowledge followed by teachers-271 (42.95%), peers-1 (0.16%), parents-1 (0.16%) and observation/experience-1 (0.16%).

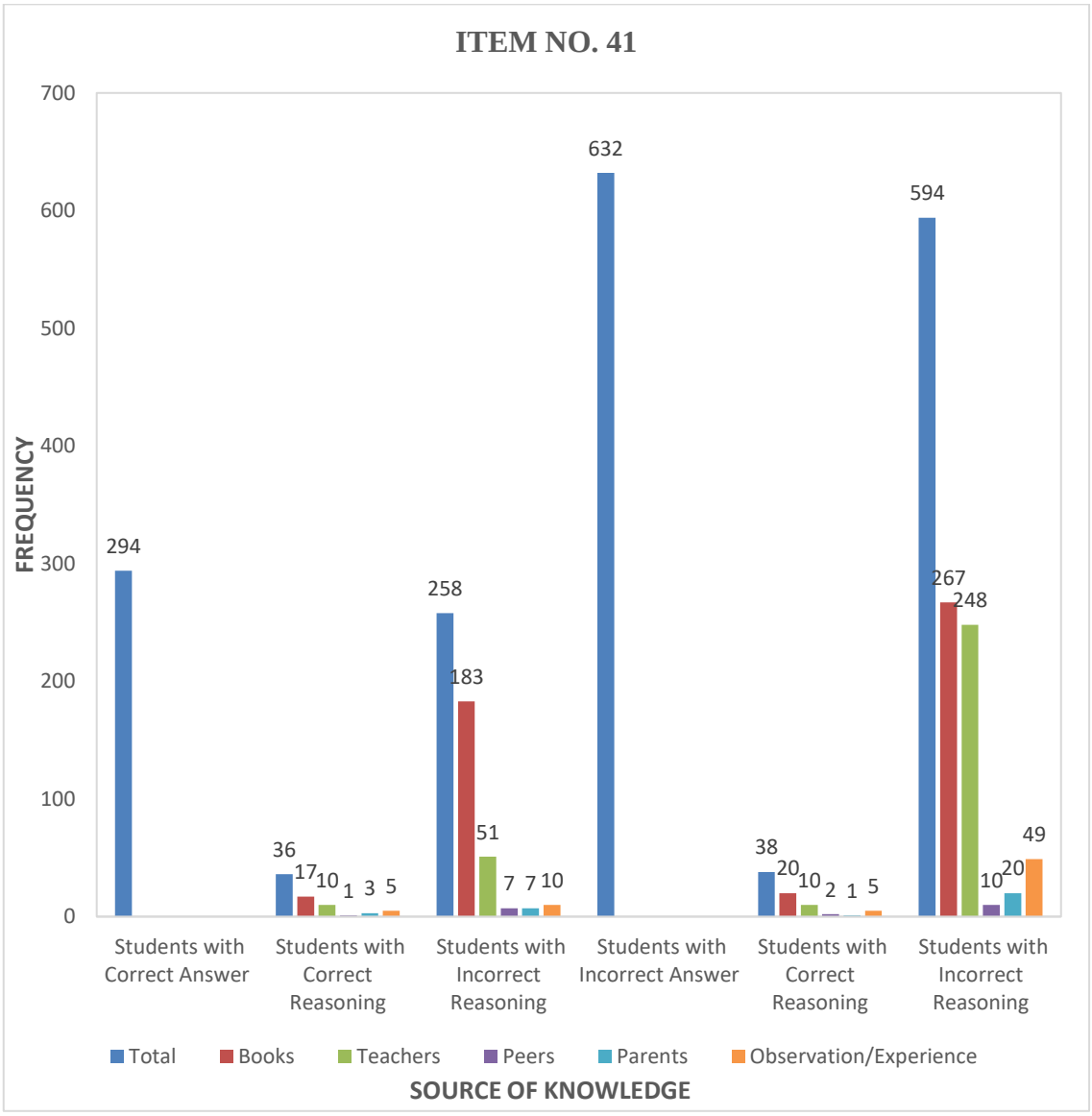
Out of 926 students 549 (59.28%) students considered books as their primary source of knowledge followed by teachers 356 (38.44%), peers 9 (0.97%), parents 5 (0.53%) and observations/experiences 7 (0.75%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 31 (3.35%) students had complete understanding of concept, 264 (28.50%) students had partial understanding of concept and 631 (68.15%) students had complete misunderstanding of concept or misconception.

Table_4.45 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 41	Ringing bells in temples are made from metals.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	294(31.70)	36(12.24)	258(87.76)	632(68.30)	38(6.01)	594(93.99)
Source of Knowledge						
Books		17(47.22)	183(70.93)		20(52.63)	267(44.95)
Teachers		10(27.78)	51(19.77)		10(26.32)	248(41.75)
Peers		1(2.78)	7(2.71)		2(5.26)	10(1.68)
Parents		3(8.33)	7(2.71)		1(2.63)	20(3.37)
Observation /Experience		5(13.89)	10(3.88)		5(13.16)	49(8.25)

Graph_4.45 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.45 it is evident that regarding item No. 41 out of 926 students 294 (31.70%) students had given correct answers. Out of 294 (31.70%) students who had given correct answers 36 (12.24%) students had given correct reasoning while 258 (87.76%) students had given incorrect reasoning. Out of 36 (12.24%) students who had given correct reasoning 17 (47.22%) students considered books as their primary source of knowledge followed by teachers-10 (27.78%), peers-1 (2.78%), parents-3 (8.33%) and observation/experience-5 (13.89%). Out of 258 (87.76%) students who had given incorrect reasoning 183 (70.93%) students considered books as their primary source of knowledge followed by teachers-51 (19.77%), peers-7 (2.71%), parents-7 (2.71%) and observation/experience-10 (3.88%).

While out of 926 students 632 (68.30%) students had given incorrect answers. Out of 632 (68.30%) students who had given incorrect answers 38 (6.01%) students had given correct reasoning while 594 (93.99%) students had given incorrect reasoning. Out of 38 (6.01%) students who had given correct reasoning, 20 (52.63%) students considered books as their primary source of knowledge followed by teachers-10 (26.32%), peers-2 (5.26%), parents-1(2.63%) and observation/experience-5 (13.16%). Out of 594 (93.99 %) students who had given incorrect reasoning, 267 (44.95%) students considered books as their primary source of knowledge followed by teachers-248 (41.75%), peers-10 (1.68%), parents-20 (3.37%) and observation/experience-49 (8.25%).

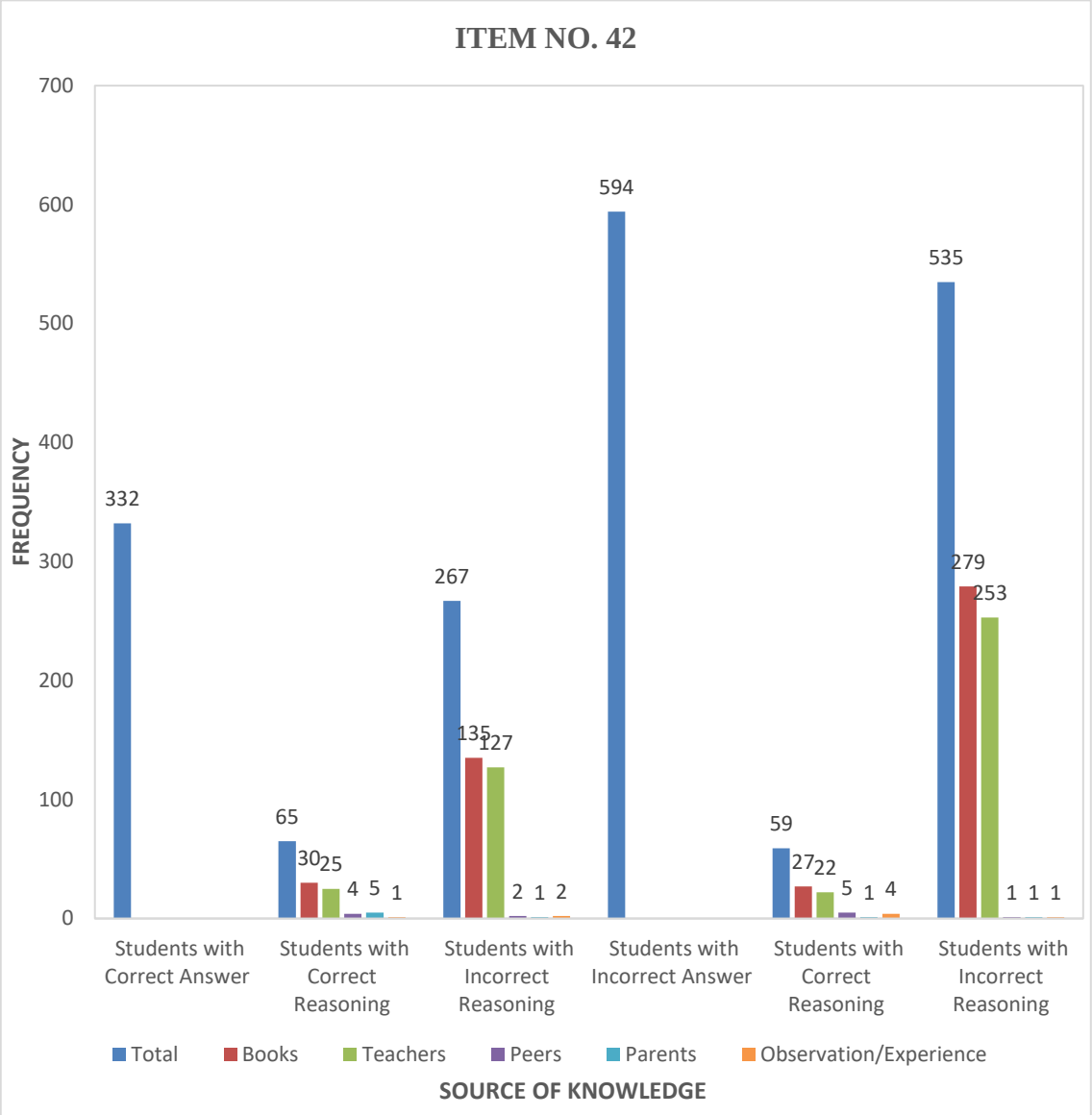
Out of 926 students 487 (52.59%) students considered books as their primary source of knowledge followed by teachers 319 (34.44%), peers 20 (2.15%), parents 31 (3.34%) and observations/experiences 69 (7.45%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 36 (3.88%) students had complete understanding of concept, 296 (31.97%) students had partial understanding of concept and 594 (64.15%) students had complete misunderstanding of concept or misconception.

Table_4.46 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 42	Zinc does not react with any form of water.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	332(35.90)	65(19.57)	267(80.43)	594(64.10)	59(9.93)	535(90.07)
Source of Knowledge						
Books		30(46.15)	135(50.65)		27(45.76)	279(52.15)
Teachers		25(38.46)	127(47.57)		22(37.29)	253(47.29)
Peers		4(6.15)	2(0.75)		5(8.47)	1(0.19)
Parents		5(7.69)	1(0.37)		1(1.69)	1(0.19)
Observation /Experience		1(1.54)	2(0.75)		4(6.78)	1(0.19)

Graph_4.46 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.46 it is evident that regarding item No. 42 out of 926 students 332 (35.90%) students had given correct answers. Out of 332 (35.90%) students who had given correct answers 65 (19.57%) students had given correct reasoning while 267 (80.43%) students had given incorrect reasoning. Out of 65 (19.57%) students who had given correct reasoning 30 (46.15%) students considered books as their primary source of knowledge followed by teachers-25 (38.46%) peers-4 (6.15%), parents-5 (7.69%) and observation/experience-1 (1.54%). Out of 267 (80.43%) students who had given incorrect reasoning 135 (50.65%) students considered books as their primary source of knowledge followed by teachers-127 (47.57%), peers-2 (0.75%), parents-1 (0.37%) and observation/experience-2 (0.75%).

While out of 926 students 594 (64.10%) students had given incorrect answers. Out of 594 (64.10%) students who had given incorrect answers 59 (9.93%) students had given correct reasoning while 535 (90.07%) students had given incorrect reasoning. Out of 59 (9.93%) students who had given correct reasoning, 27 (45.76%) students considered books as their primary source of knowledge followed by teachers-22 (37.29%), peers-5 (8.47%) , parents-1 (1.69%) and observation/experience-4 (6.78%). Out of 535 (90.07 %) students who had given incorrect reasoning, 279 (52.15%) students considered books as their primary source of knowledge followed by teachers-253 (47.29%), peers-1 (0.19%), parents-1 (0.19%) and observation/experience-1 (0.19%).

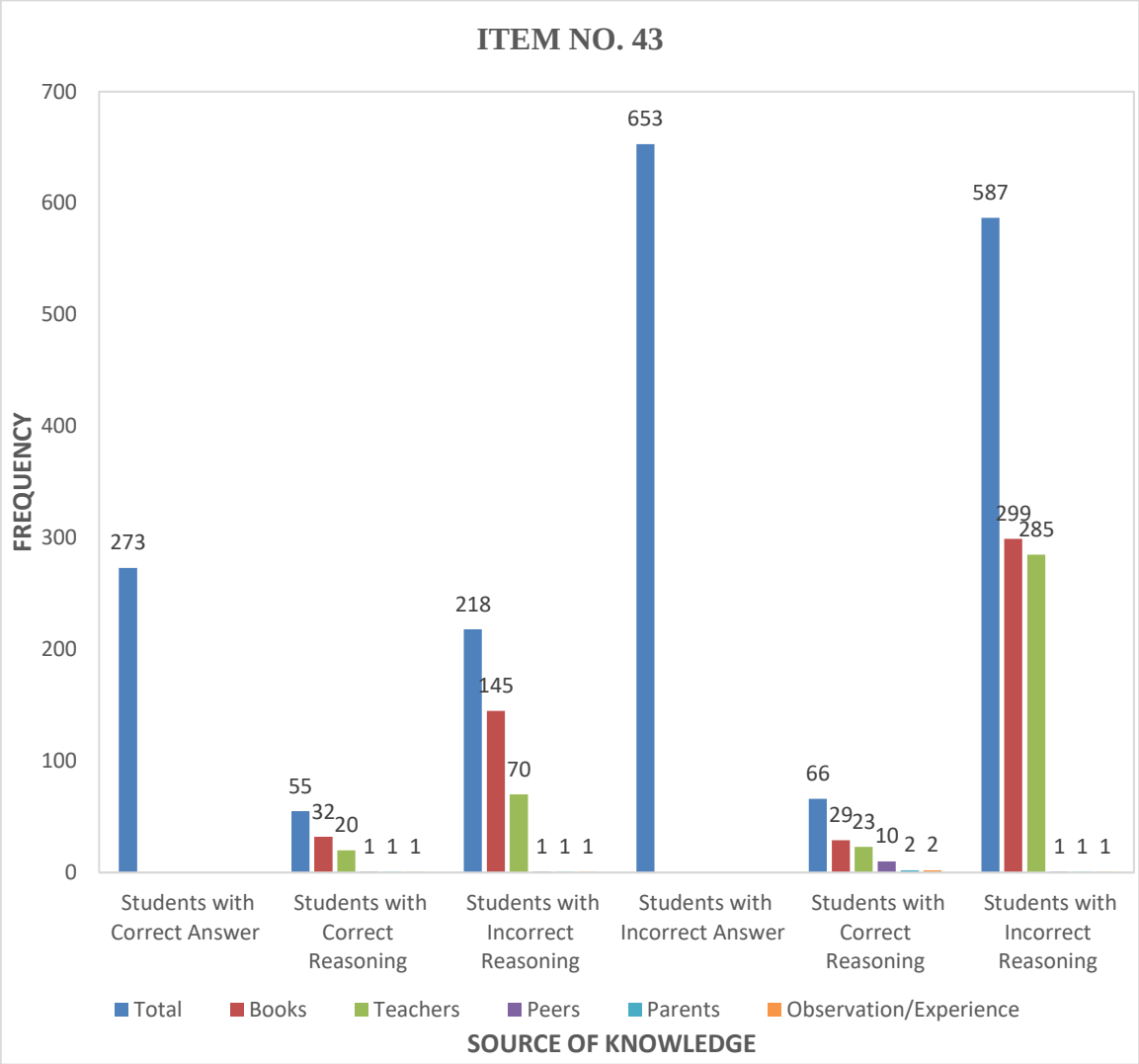
Out of 926 students 471 (50.86%) students considered books as their primary source of knowledge followed by teachers 427 (46.11%), peers 12 (1.29%), parents 8 (0.86%) and observations/experiences 8 (0.86%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 65 (7.01%) students had complete understanding of concept, 326 (35.22%) students had partial understanding of concept and 535 (57.77%) students had complete misunderstanding of concept or misconception.

Table_4.47 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 43	All non-metals do not dissolve in water.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	273(29.50)	55(20.14)	218(79.85)	653(70.50)	66(10.10)	587(89.90)
Source of Knowledge						
Books		32(58.18)	145(66.51)		29(45.76)	299(50.94)
Teachers		20(36.36)	70(32.11)		23(37.29)	285(48.55)
Peers		1(1.82)	1(0.46)		10(8.47)	1(0.17)
Parents		1(1.82)	1(0.46)		2(3.03)	1(0.17)
Observation /Experience		1(1.82)	1(0.46)		2(3.03)	1(0.17)

Graph_4.47 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.47 it is evident that regarding item No. 43 out of 926 students 273 (29.50%) students had given correct answers. Out of 273 (29.50%) students who had given correct answers 55 (20.14%) students had given correct reasoning while 218 (79.85%) students had given incorrect reasoning. Out of 55 (20.14%) students who had given correct reasoning 32 (58.18%) students considered books as their primary source of knowledge followed by teachers-20 (36.36%) peers-1 (1.82%), parents-1 (1.82%) and observation/experience-1 (1.82%). Out of 218 (79.85%) students who had given incorrect reasoning 145 (66.51%) students considered books as their primary source of knowledge followed by teachers-70 (32.11%), peers-1 (0.46%), parents-1 (0.46%) and observation/experience-1 (0.46%).

While out of 926 students 653 (70.50%) students had given incorrect answers. Out of 653 (70.50%) students who had given incorrect answers 66 (10.10%) students had given correct reasoning while 587 (89.90%) students had given incorrect reasoning. Out of 66 (10.10%) students who had given correct reasoning, 29 (45.76%) students considered books as their primary source of knowledge followed by teachers-23 (37.29%), peers-10 (8.47%), parents-2 (3.03%) and observation/experience-2 (3.03%). Out of 587 (89.90 %) students who had given incorrect reasoning, 299 (50.94%) students considered books as their primary source of knowledge followed by teachers-285 (48.55%), peers-1 (0.17%), parents-1 (0.17%) and observation/experience-1 (0.17%).

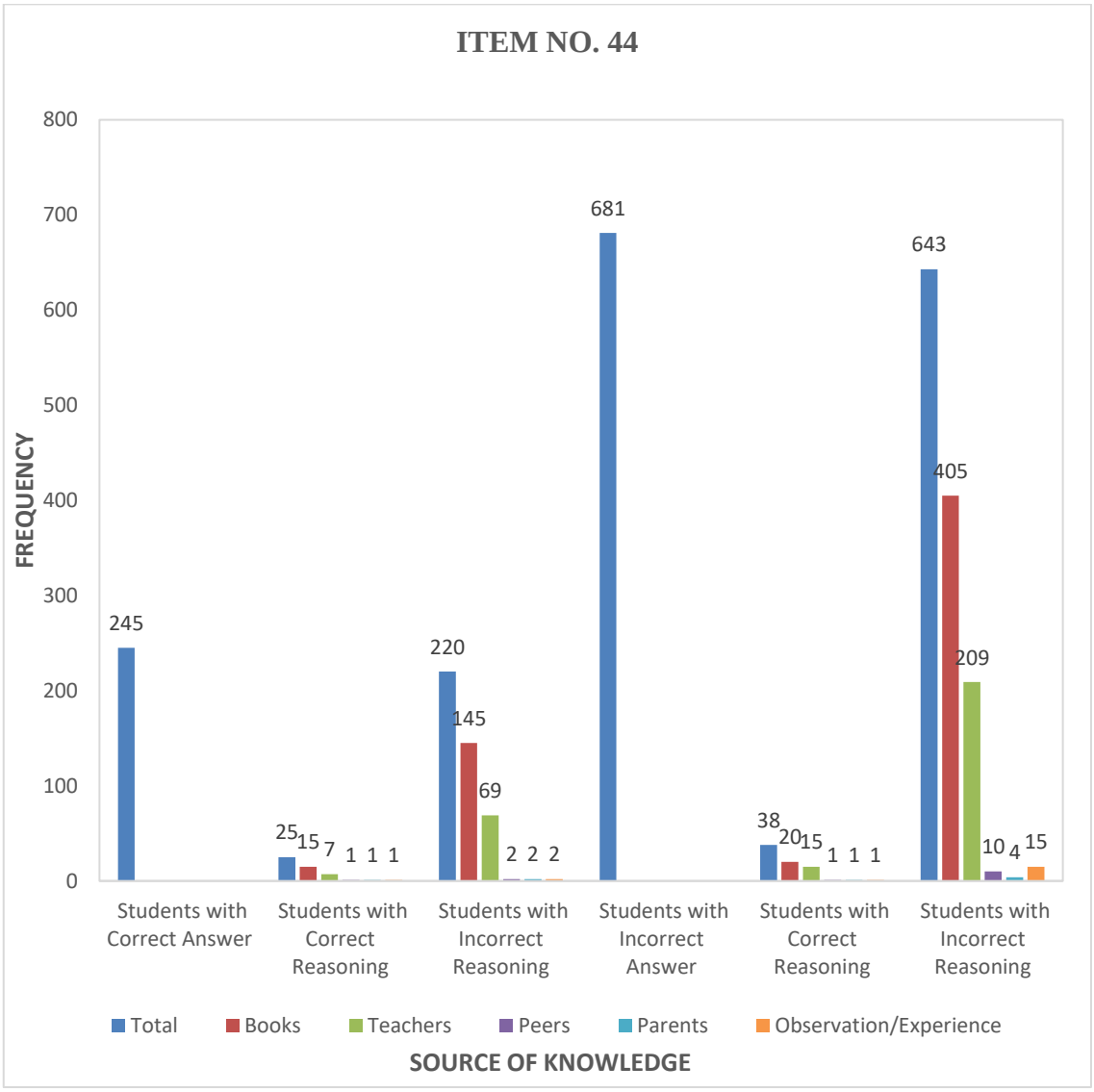
Out of 926 students 505 (54.53%) students considered books as their primary source of knowledge followed by teachers 398 (42.98%), peers 13 (1.40%), parents 5 (0.53%) and observations/experiences 5 (0.53%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 55 (5.93%) students had complete understanding of concept, 284 (30.67%) students had partial understanding of concept and 587 (63.40%) students had complete misunderstanding of concept or misconception.

Table_4.48 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 44	Gold and silver is generally used for making ornaments.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	245(26.50)	25(10.20)	220(89.80)	681(73.50)	38(5.58)	643(94.42)
Source of Knowledge						
Books		15(60.00)	145(65.91)		20(52.63)	405(62.99)
Teachers		7(28.00)	69(31.36)		15(39.47)	209(32.50)
Peers		1(4.00)	2(0.91)		1(2.63)	10(1.56)
Parents		1(4.00)	2(0.91)		1(2.63)	4(0.62)
Observation /Experience		1(4.00)	2(0.91)		1(2.63)	15(2.33)

Graph_4.48 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.48 it is evident that regarding item No. 44 out of 926 students 245 (26.50%) students had given correct answers. Out of 245 (26.50%) students who had given correct answers 25 (10.20%) students had given correct reasoning while 220 (89.80%) students had given incorrect reasoning. Out of 25 (10.20%) students who had given correct reasoning 15 (60%) students considered books as their primary source of knowledge followed by teachers-7 (28.00 %), peers-1 (4%), parents-1 (4%) and observation/experience-1 (4%). Out of 220 (89.80%) students who had given incorrect reasoning 145 (65.91%) students considered books as their primary source of knowledge followed by teachers-69 (31.36%), peers-2 (0.91%), parents-2 (0.91%) and observation/experience-2 (0.91%).

While out of 926 students 681 (73.50%) students had given incorrect answers. Out of 681 (73.50%) students who had given incorrect answers 38 (5.58%) students had given correct reasoning while 643 (94.42%) students had given incorrect reasoning. Out of 38 (5.58%) students who had given correct reasoning, 20 (52.63%) students considered books as their primary source of knowledge followed by teachers-15 (39.47%), peers-1 (2.63%), parents-1 (2.63%) and observation/experience-1 (2.63%). Out of 643 (94.42 %) students who had given incorrect reasoning, 405 (62.99%) students considered books as their primary source of knowledge followed by teachers-209 (32.50%), peers-10 (1.56%), parents-4 (0.62%) and observation/experience-15 (2.33%).

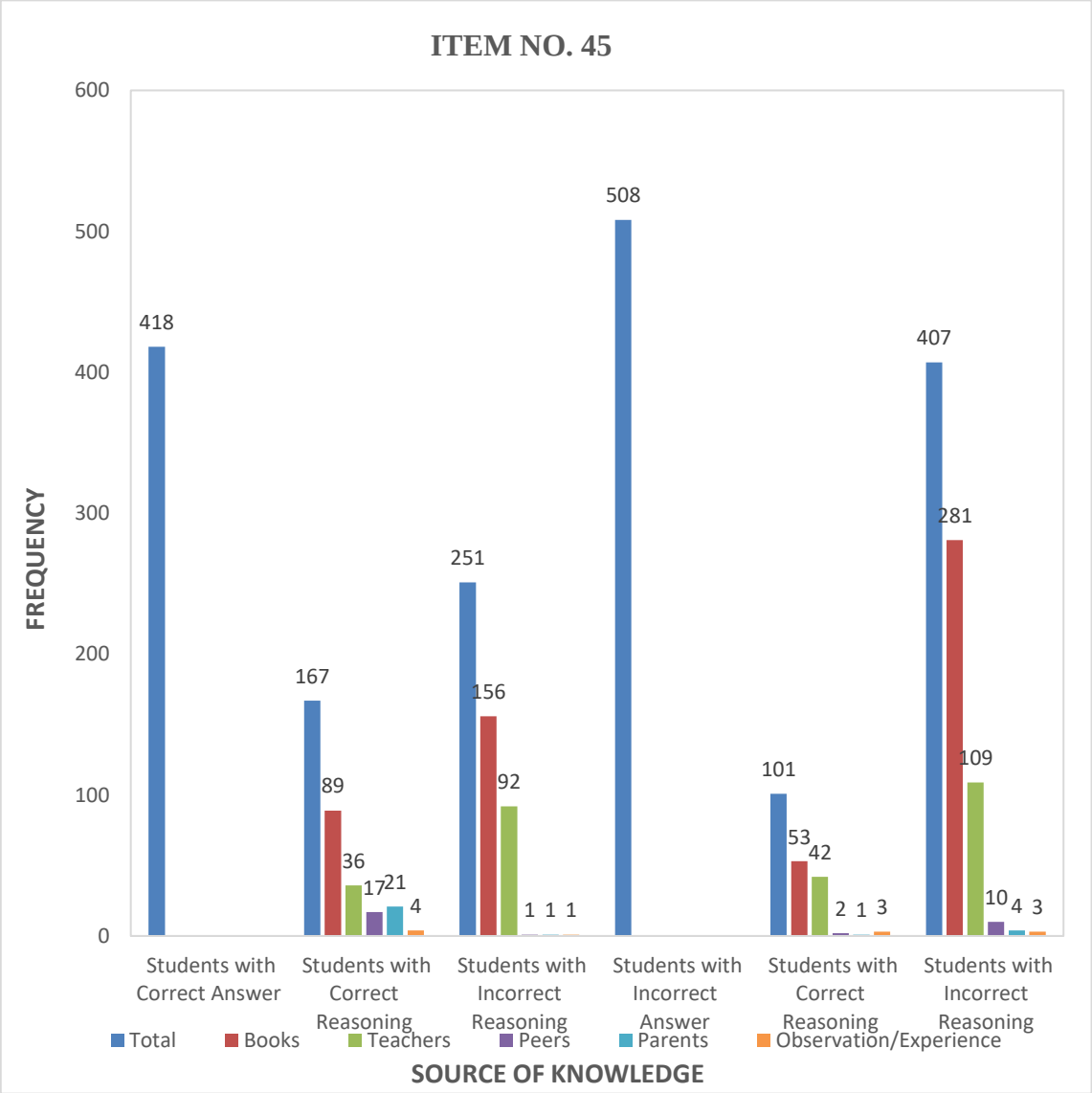
Out of 926 students 585 (63.17 %) students considered books as their primary source of knowledge followed by teachers 300 (32.39%), peers 14 (1.51%), parents 8 (0.86%) and observations/experiences 19 (2.05%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 25 (2.69%) students had complete understanding of concept, 258 (27.87%) students had partial understanding of concept and 643 (69.45%) students had complete misunderstanding of concept or misconception.

Table_4.49 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 45	Metals react with acids to release hydrogen gas.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	418(45.14)	167(39.95)	251(60.05)	508(54.96)	101(19.88)	407(80.12)
Source of Knowledge						
Books		89(53.29)	156(62.15)		53(52.48)	281(69.04)
Teachers		36(21.56)	92(36.65)		42(41.58)	109(26.78)
Peers		17(10.18)	1(0.40)		2(1.98)	10(2.46)
Parents		21(12.57)	1(0.40)		1(0.99)	4(0.98)
Observation /Experience		4(2.40)	1(0.40)		3(2.97)	3(0.74)

Graph_4.49 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.49 it is evident that regarding item No. 45 out of 926 students 418 (45.14%) students had given correct answers. Out of 418 (45.14%) students who had given correct answers 167 (39.95%) students had given correct reasoning while 251 (60.05%) students had given incorrect reasoning. Out of 167 (39.95%) students who had given correct reasoning 89 (53.29%) students considered books as their primary source of knowledge followed by teachers-36 (21.56%) peers-17 (10.18%), parents-21 (12.57 %) and observation/experience-4 (2.40%). Out of 251 (60.05%) students who had given incorrect reasoning 156 (62.15%) students considered books as their primary source of knowledge followed by teachers-92 (36.65%), peers-1 (0.40%), parents-1 (0.40%) and observation/experience-1 (0.40%).

While out of 926 students 508 students had given incorrect answers. Out of 508 (54.96 %) students who had given incorrect answers 101 (19.88%) students had given correct reasoning while 407 (80.12%) students had given incorrect reasoning. Out of 101 (19.88 %) students who had given correct reasoning, 53 (52.48%) students considered books as their primary source of knowledge followed by teachers-42 (41.58%), peers-2 (1.98%), parents-1 (0.99%) and observation/experience-3 (2.97%). Out of 407 (80.12 %) students who had given incorrect reasoning, 281(69.04%) students considered books as their primary source of knowledge followed by teachers-109 (26.78%), peers-10 (2.46%), parents-4 (0.98 %) and observation/experience-3 (0.74%).

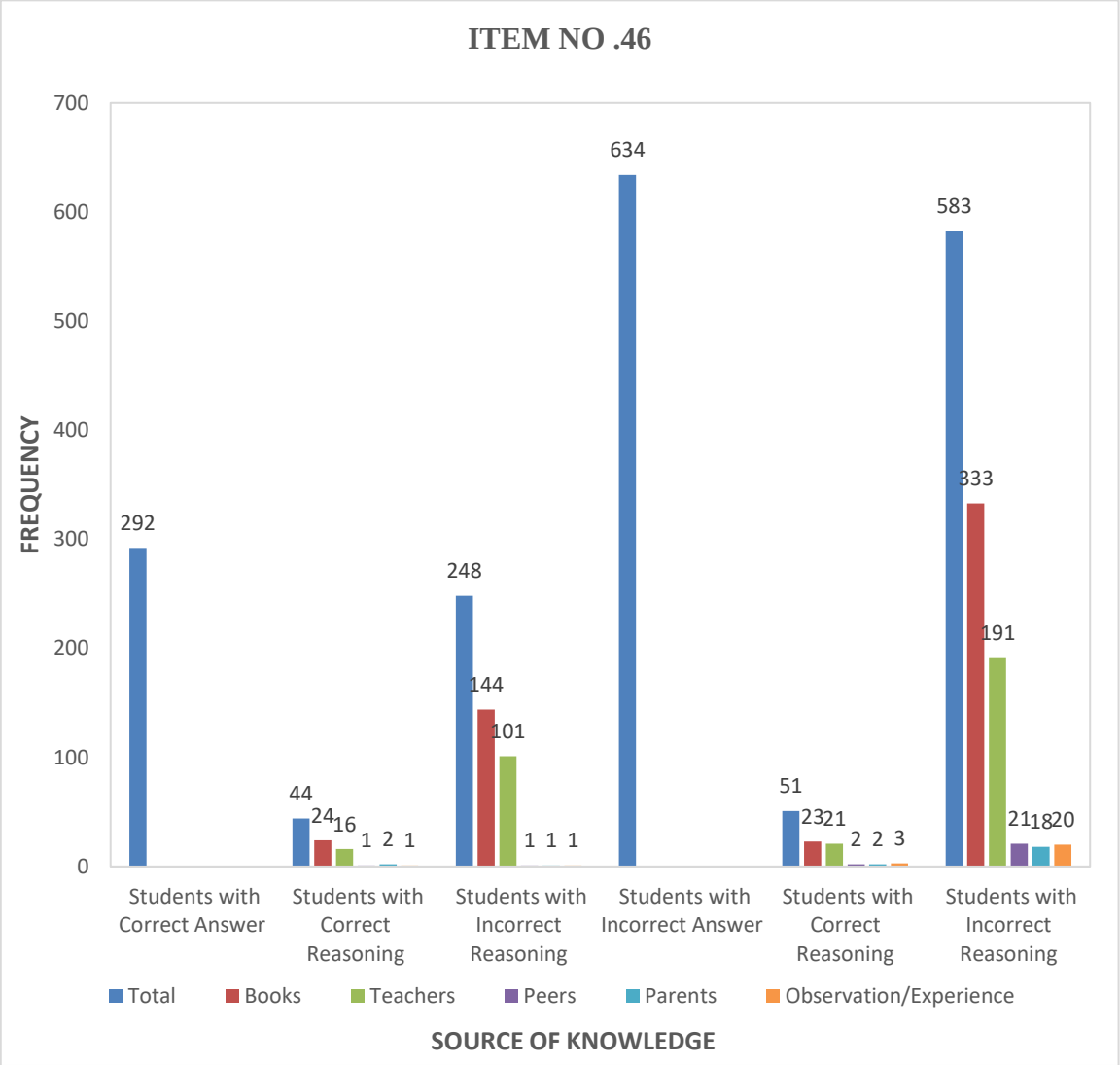
Out of 926 students 579 (62.52%) students considered books as their primary source of knowledge followed by teachers 279 (30.12%), peers 30 (3.23%), parents 27 (2.91%) and observations/experiences 11 (1.18%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 167 (18.03%) students had complete understanding of concept, 352 (38.02%) students had partial understanding of concept and 407 (43.95%) students had complete misunderstanding of concept or misconception.

Table_4.50 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 46	All non-metals are no-lustrous.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	292(31.53)	44(15.06)	248(84.94)	634(68.57)	51(8.04)	583(91.96)
Source of Knowledge						
Books		24(54.55)	144(58.06)		23(45.10)	333(57.12)
Teachers		16(36.36)	101(40.73)		21(41.18)	191(32.76)
Peers		1(2.27)	1(0.40)		2(3.92)	21(3.60)
Parents		2(4.55)	1(0.40)		2(3.92)	18(3.09)
Observation /Experience		1(2.27)	1(0.40)		3(5.88)	20(3.43)

Graph_4.50 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.50 it is evident that regarding item No. 46 out of 926 students 292 (31.53%) students had given correct answers. Out of 292 (31.53%) students who had given correct answers 44 (15.06%) students had given correct reasoning while 248 (84.94%) students had given incorrect reasoning. Out of 44 (15.06%) students who had given correct reasoning 24 (54.55%) students considered books as their primary source of knowledge followed by teachers-16 (36.36%) peers-1 (2.27%), parents-2 (4.55%) and observation/experience-1 (2.27%). Out of 248 (84.94%) students who had given incorrect reasoning 144 (58.06%) students considered books as their primary source of knowledge followed by teachers-101 (40.73%), peers-1 (0.40%), parents-1 (0.40%) and observation/experience-1 (0.40%).

While out of 926 students 634 (68.57%) students had given incorrect answers. Out of 634 (68.57%) students who had given incorrect answers 51 (8.04 %) students had given correct reasoning while 583 (91.96%) students had given incorrect reasoning. Out of 51 (8.04%) students who had given correct reasoning, 23 (45.10%) students considered books as their primary source of knowledge followed by teachers-21 (41.18%), peers-2 (3.92%), parents-2 (3.92%) and observation/experience-3 (5.88%). Out of 583 (91.96 %) students who had given incorrect reasoning, 333 (57.12%) students considered books as their primary source of knowledge followed by teachers-191 (32.76%), peers-21 (3.60%), parents-18 (3.09%) and observation/experience-20 (3.43%).

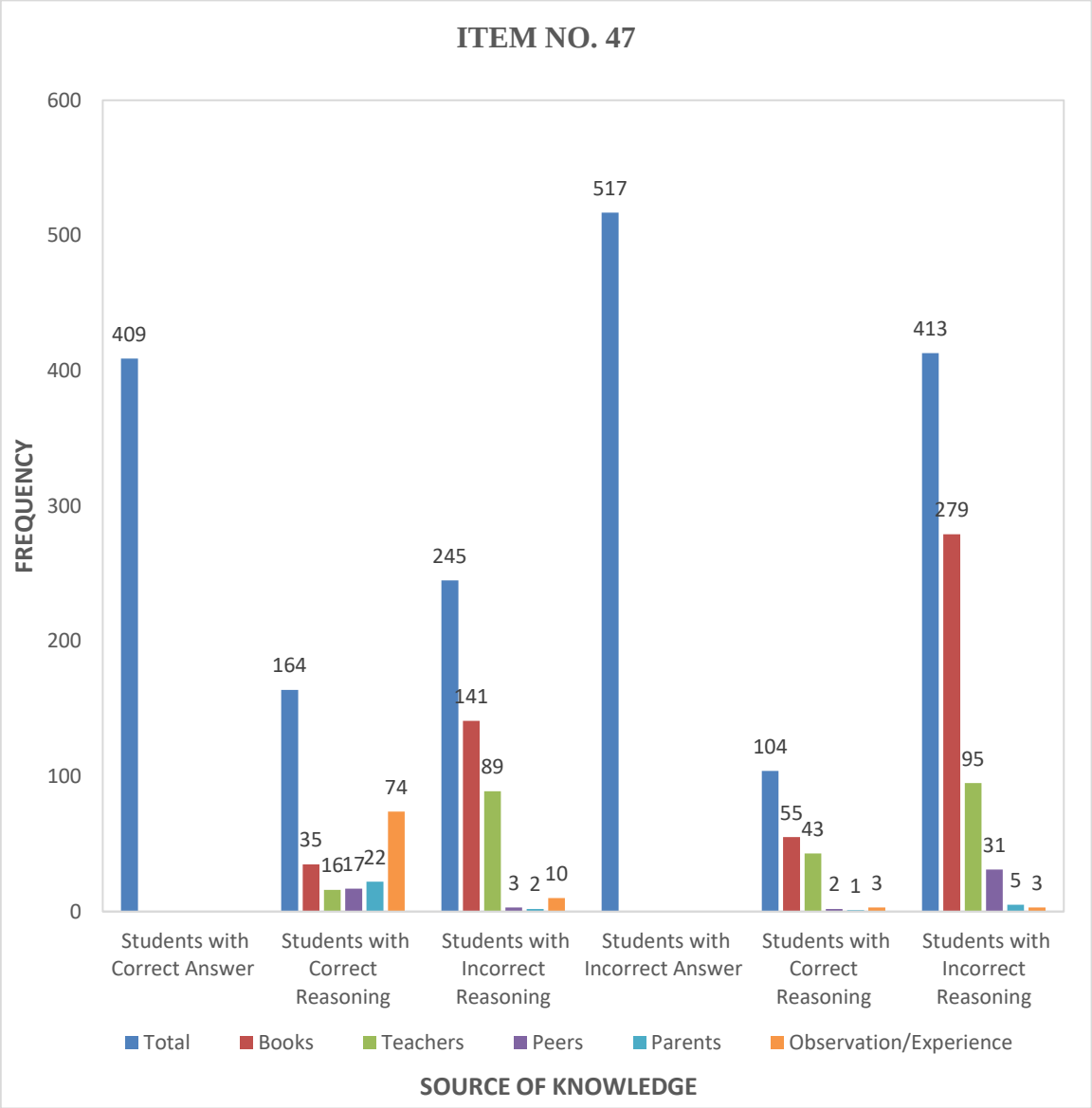
Out of 926 students 524 (56.58%) students considered books as their primary source of knowledge followed by teachers 329 (35.52%), peers 25 (2.69%), parents 23 (2.48%) and observations/experiences 25 (2.69%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 44 (4.75%) students had complete understanding of concept, 299 (32.30%) students had partial understanding of concept and 583 (62.95%) students had complete misunderstanding of concept or misconception.

Table_4.51 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 47	Metals are not used to make handles of cooking utensils.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	409(44.17)	164(40.09)	245(59.91)	517(55.80)	104(20.11)	413(79.90)
Source of Knowledge						
Books		35(21.34)	141(57.55)		55(52.88)	279(67.55)
Teachers		16(9.76)	89(36.33)		43(41.35)	95(23.00)
Peers		17(10.37)	3(1.22)		2(1.92)	31(7.51)
Parents		22(13.41)	2(0.82)		1(0.96)	5(1.21)
Observation /Experience		74(45.12)	10(4.08)		3(2.88)	3(0.73)

Graph_4.51 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.51 it is evident that regarding item No. 47 out of 926 students 409 (44.17 %) students had given correct answers. Out of 409 (44.17%) students who had given correct answers 164 (40.09%) students had given correct reasoning while 245 (59.91%) students had given incorrect reasoning. Out of 164 (40.09%) students who had given correct reasoning 35 (21.34%) students considered books as their primary source of knowledge followed by teachers-16 (9.76%) peers-17 (10.37%), parents-22 (13.41%) and observation/experience-74 (45.12%). Out of 245 (59.91%) students who had given incorrect reasoning 141(57.55%) students considered books as their primary source of knowledge followed by teachers-89 (36.33%), peers-3 (1.22%), parents-2 (0.82%) and observation/experience-10 (4.08%).

While out of 926 students 517 (55.80%) students had given incorrect answers. Out of 517 (55.80%) students who had given incorrect answers 104 (20.11%) students had given correct reasoning while 413(79.90%) students had given incorrect reasoning. Out of 104 (20.11%) students who had given correct reasoning, 55 (52.88%) students considered books as their primary source of knowledge followed by teachers-43 (41.35 %), peers-2 (1.92%), parents-1 (0.96%) and observation/experience-3 (2.88%). Out of 413 (79.90%) students who had given incorrect reasoning, 279 (67.55%) students considered books as their primary source of knowledge followed by teachers-95 (23.00 %) , peers-31 (7.51%), parents-5 (1.21%) and observation/experience-3 (0.73%).

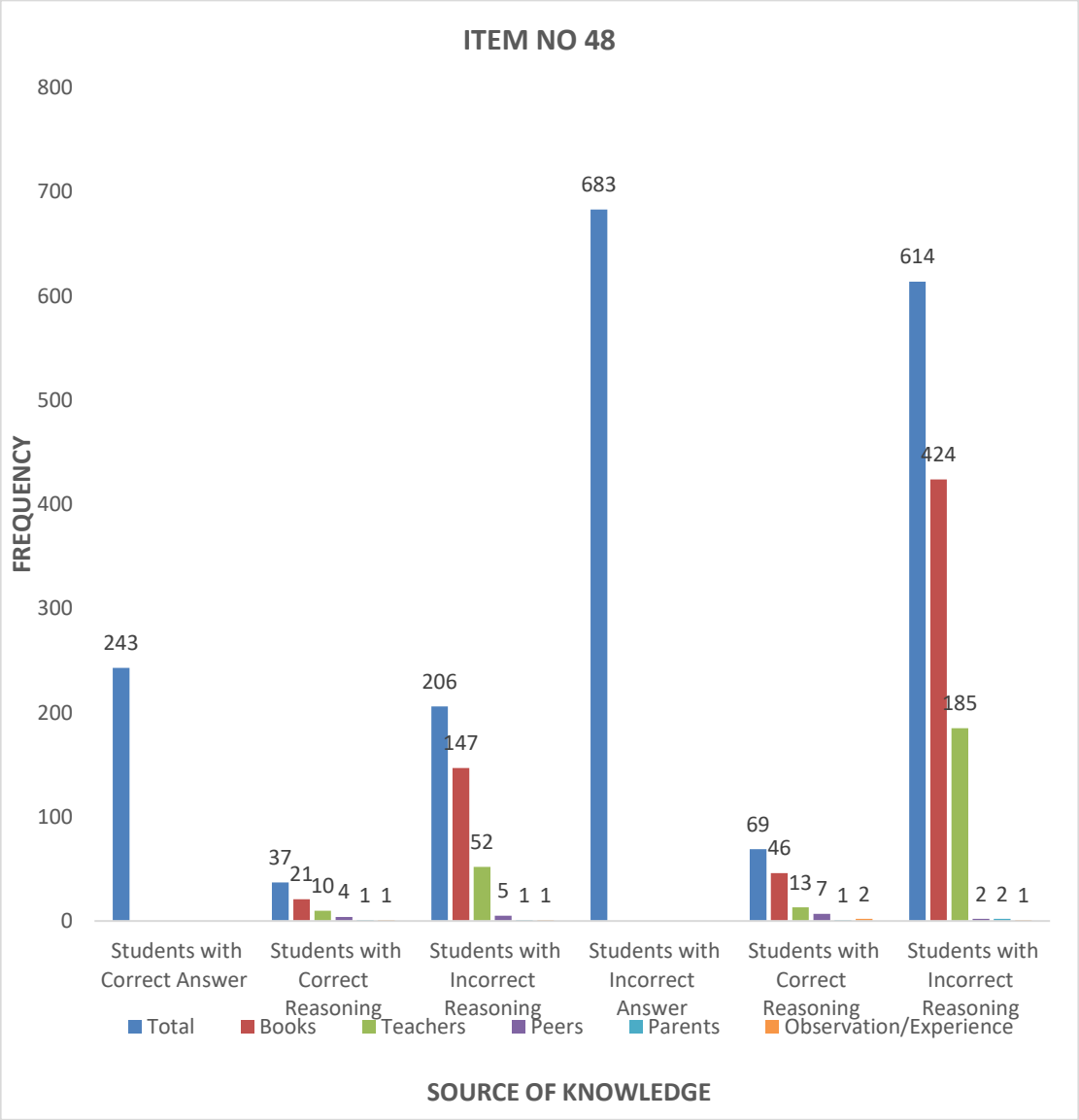
Out of 926 students 510 (55.07%) students considered books as their primary source of knowledge followed by teachers 243 (26.24%), peers 53 (5.72%), parents 30 (3.23%) and observations/experiences 90 (9.71%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 164 (17.71%) students had complete understanding of concept, 349 (37.68%) students had partial understanding of concept and 413 (44.61%) students had complete misunderstanding of concept or misconception.

Table_4.52 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 48	Sodium and potassium can be easily cut with knife.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	243(26.24)	37(15.22)	206(84.78)	683(73.86)	69(10.10)	614(89.90)
Source of Knowledge						
Books		21(56.76)	147(71.36)		46(66.67)	424(69.05)
Teachers		10(27.03)	52(25.24)		13(18.84)	185(30.13)
Peers		4(10.81)	5(2.43)		7(10.14)	2(0.33)
Parents		1(2.70)	1(0.49)		1(1.45)	2(0.33)
Observation /Experience		1(2.70)	1(0.49)		2(2.90)	1(0.16)

Graph_4.52 Student's Reasons and Source of Knowledge (Chemistry)



From table and graph 4.52 it is evident that regarding item No. 48 out of 926 students 243 (26.24%) students had given correct answers. Out of 243 (26.24%) students who had given correct answers 37 (15.22%) students had given correct reasoning while 206 (84.78%) students had given incorrect reasoning. Out of 37 (15.22%) students who had given correct reasoning 21 (56.76%) students considered books as their primary source of knowledge followed by teachers-10 (27.03%) peers-4 (10.81%), parents-1 (2.70%) and observation/experience-1 (2.70%). Out of 206 (84.78%) students who had given incorrect reasoning 147 (71.36%) students considered books as their primary source of knowledge followed by teachers-52 (25.24%), peers-5 (2.43%), parents-1 (0.49%) and observation/experience-1 (0.49%).

While out of 926 students 683 (73.86%) students had given incorrect answers. Out of 683 (73.86%) students who had given incorrect answers 69 (10.10%) students had given correct reasoning while 614 (89.90%) students had given incorrect reasoning. Out of 69 (10.10%) students who had given correct reasoning, 46 (66.67%) students considered books as their primary source of knowledge followed by teachers-13 (18.84%), peers-7 (10.14%), parents-1 (1.45%) and observation/experience-2 (2.90%). Out of 614 (89.90 %) students who had given incorrect reasoning, 426 (69.05%) students considered books as their primary source of knowledge followed by teachers-185 (30.13%), peers-2 (0.33%), parents-2 (0.33%) and observation/experience-1 (0.16%).

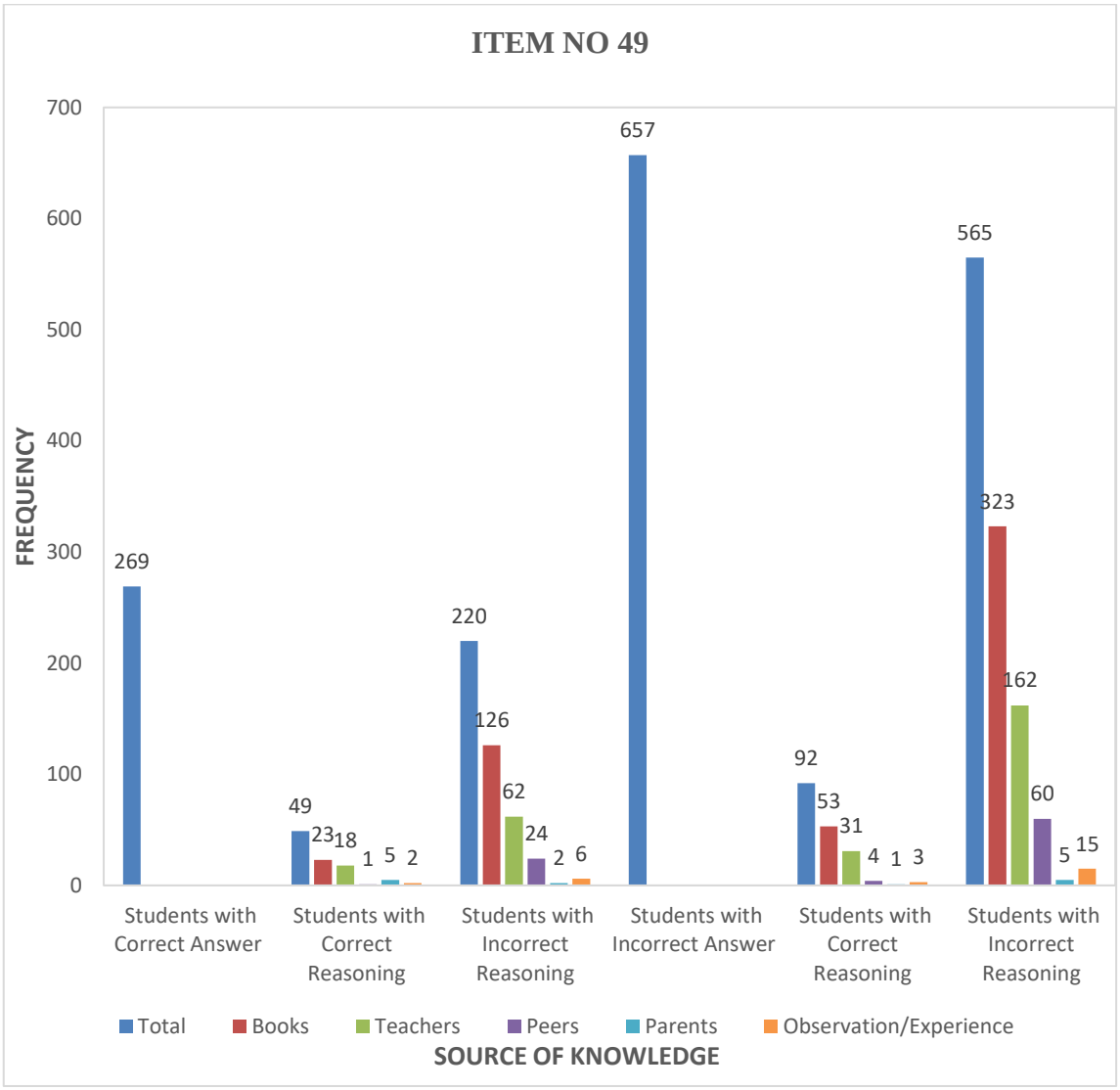
Out of 926 students 638 (68.89%) students considered books as their primary source of knowledge followed by teachers 260 (28.07%), peers 18 (1.94%), parents 5 (0.53%) and observations/experiences 5 (0.53%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 37 (15.22%) students had complete understanding of concept, 275 (29.69%) students had partial understanding of concept and 614 (66.30%) students had complete misunderstanding of concept or misconception.

Table_4.53 Student's Reasons and Source of Knowledge (Chemistry)

Item No. 49	Aluminium can be converted into foil due to the property of sonority.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	269(29.05)	49(18.21)	220(81.79)	657(70.95)	92(14.00)	565(86.00)
Source of Knowledge						
Books		23(46.94)	126(57.27)		53(57.61)	323(57.17)
Teachers		18(36.73)	62(28.18)		31(33.70)	162(28.67)
Peers		1(2.04)	24(10.91)		4(4.35)	60(10.62)
Parents		5(10.20)	2(0.91)		1(1.09)	5(0.88)
Observation/Experience		2(4.08)	6(2.73)		3(3.26)	15(2.65)

Graph_4.53 Students Reasons and Source of Knowledge (Chemistry)



From table and graph 4.53 it is evident that regarding item No. 49 out of 926 students 269 (29.05%) students had given correct answers. Out of 269 (29.05%) students who had given correct answers 49 (18.21%) students had given correct reasoning while 220 students had given incorrect reasoning. Out of 49 (18.21%) students who had given correct reasoning 23 (46.94%) students considered books as their primary source of knowledge followed by teachers-18 (36.73%), peers-1 (2.04%), parents-5 (10.20%) and observation/experience-2 (4.08%). Out of 220 (81.79%) students who had given incorrect reasoning 126 (57.27%) students considered books as their primary source of knowledge followed by teachers-62 (28.18%), peers-24 (10.91%), parents-2 (0.91%) and observation/experience-6 (2.73%).

While out of 926 students 657 (70.95%) students had given incorrect answers. Out of 657 (70.95%) students who had given incorrect answers 92 (14%) students had given correct reasoning while 565 (86%) students had given incorrect reasoning. Out of 92 (14%) students who had given correct reasoning, 53 (57.61%) students considered books as their primary source of knowledge followed by teachers-31 (33.70%), peers-4 (4.35%), parents-1 (1.09 %) and observation/experience-3. Out of 565 (86%) students who had given incorrect reasoning, 323 (57.17%) students considered books as their primary source of knowledge followed by teachers-161 (28.67 %), peers-60 (10.62%), parents-5 (0.88%) and observation/experience-15 (2.65%).

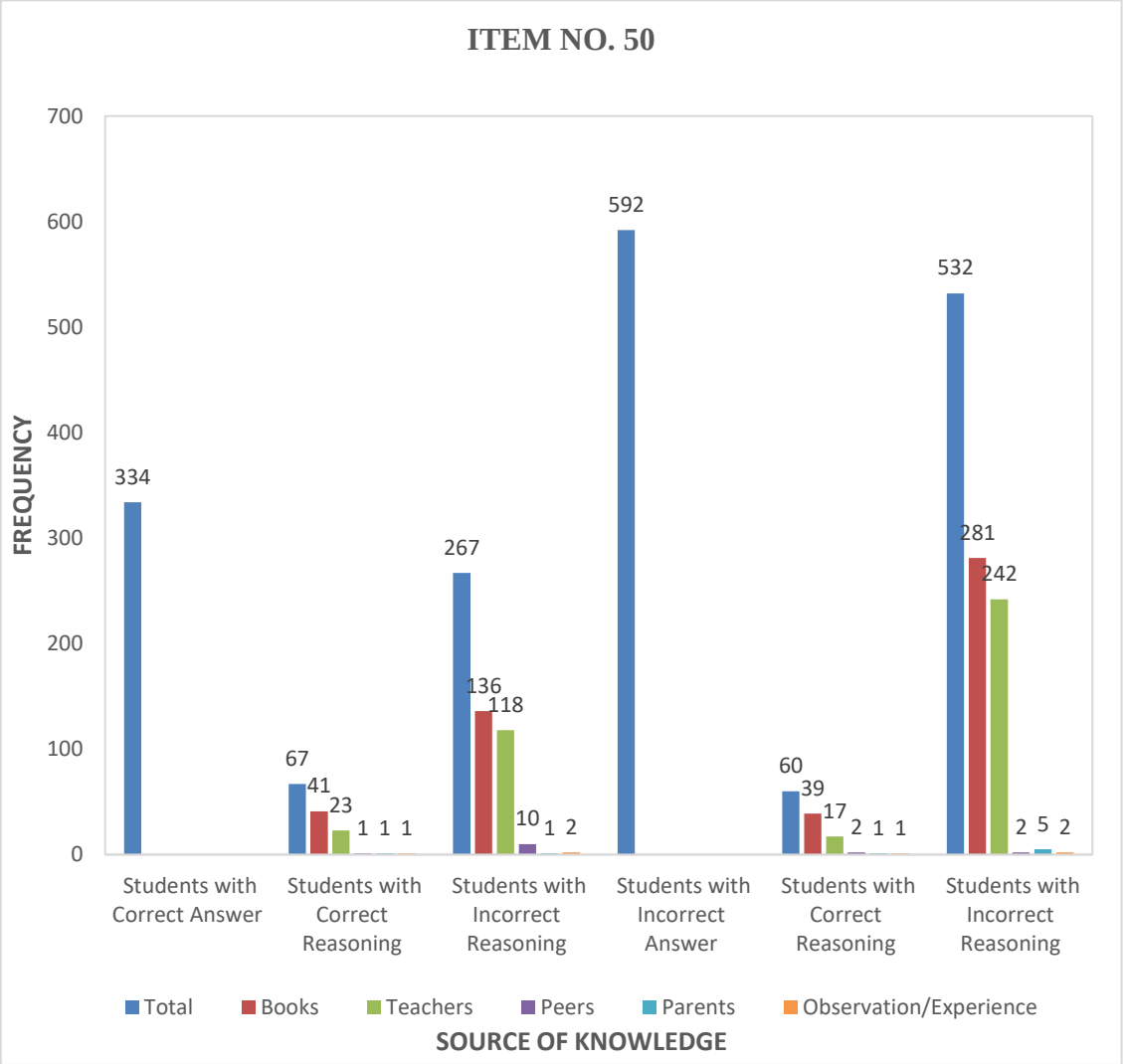
Out of 926 students 525 (56.69%) students considered books as their primary source of knowledge followed by teachers 273 (29.48%), peers 89 (9.61%), parents 13 (1.40%) and observations/experiences 26 (2.80%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 49 (5.29%) students had complete understanding of concept, 312 (33.69%) students had partial understanding of concept and 565 (61.02%) students had complete misunderstanding of concept or misconception.

Table_4.54 Student's Reasons and Source of Knowledge (Biology)

Item No. 50	The life of every human being starts with just one cell.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	334(36.07)	67(20.05)	267(79.95)	592(63.93)	60(10.13)	532(89.87)
Source of Knowledge						
Books		41(61.19)	136(50.94)		39(65.00)	281(52.82)
Teachers		23(34.33)	118(44.19)		17(28.33)	242(45.49)
Peers		1(1.49)	10(3.75)		2(3.33)	2(0.38)
Parents		1(1.49)	1(0.37)		1(1.67)	5(0.94)
Observation/Experience		1(1.49)	2(2.75)		1(1.67)	2(0.38)

Graph_4.54 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.54 it is evident that regarding item No. 50 out of 926 students 334 (36.07 %) students had given correct answers. Out of 334 (36.07%) students who had given correct answers 67 (20.05%) students had given correct reasoning while 267 (79.95%) students had given incorrect reasoning. Out of 67 (20.05%) students who had given correct reasoning 41 (61.19%) students considered books as their primary source of knowledge followed by teachers-23 (34.33%), peers-1 (1.49%), parents-1 (1.49%) and observation/experience-1 (1.49%). Out of 267 (79.95%) students who had given incorrect reasoning 136 (50.94%) students considered books as their primary source of knowledge followed by teachers-118 (44.19%), peers-10 (3.75%) , parents-1 (0.37%) and observation/experience-2 (2.75%).

While out of 926 students 592 students had given incorrect answers. Out of 592 (63.93 %) students who had given incorrect answers 60 (10.13%) students had given correct reasoning while 532 (89.87%) students had given incorrect reasoning. Out of 60 (10.13 %) students who had given correct reasoning, 39 (65%) students considered books as their primary source of knowledge followed by teachers-17 (28.33%), peers-2 (3.33%), parents-1 (1.67%) and observation/experience-1 (1.67%). Out of 532 (89.87%) students who had given incorrect reasoning, 281 (52.82%) students considered books as their primary source of knowledge followed by teachers-242 (45.49%), peers-2 (0.38 %), parents-5 (0.94%) and observation/experience-2 (0.38%).

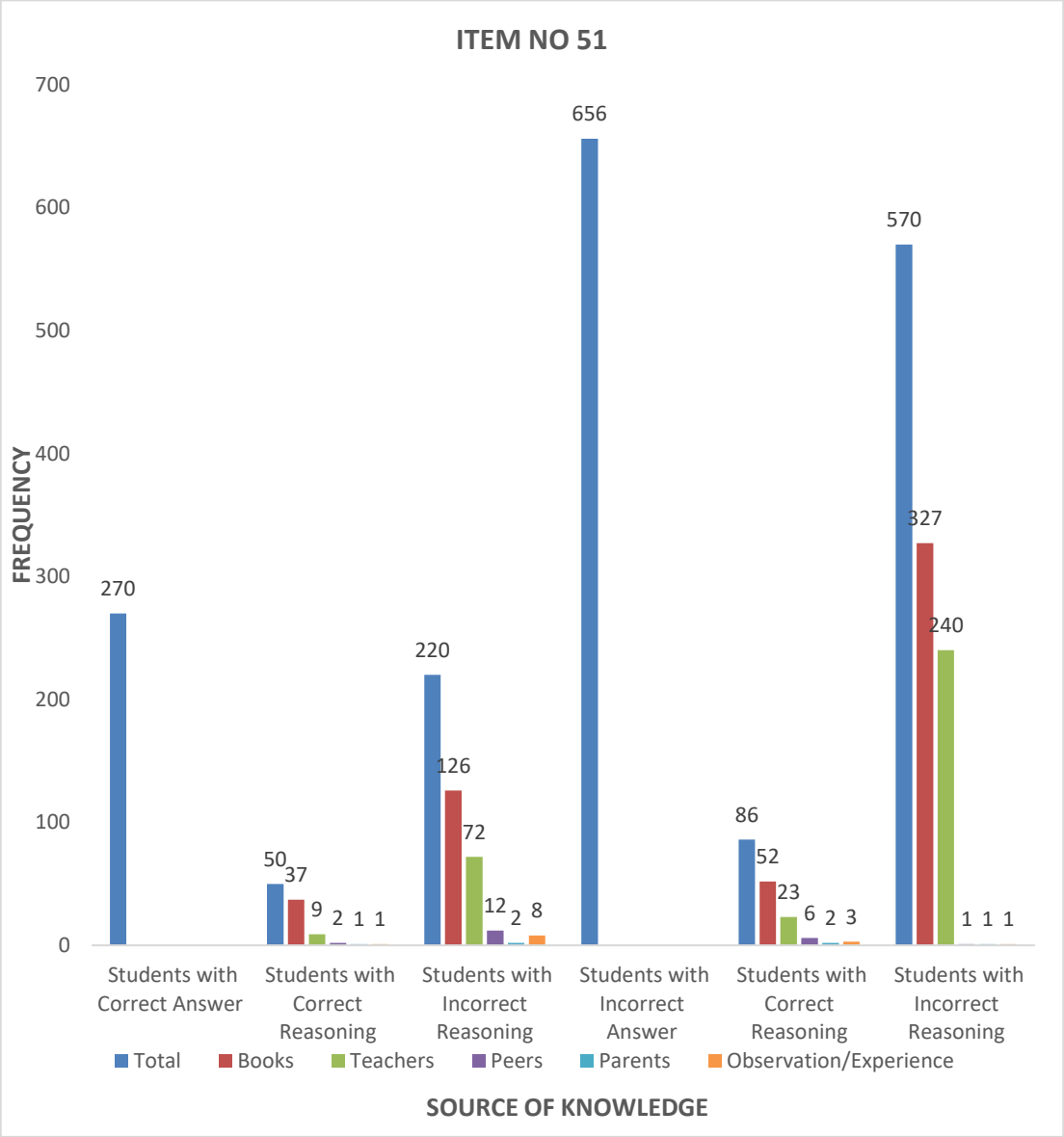
Out of 926 students 497 (53.67%) students considered books as their primary source of knowledge followed by teachers 400 (43.19%), peers 15 (1.61%), parents 8 (0.86%) and observations/experiences 6 (0.64%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 49 (5.29%) students had complete understanding of concept, 312 (33.69%) students had partial understanding of concept and 565 (61.02%) students had complete misunderstanding of concept or misconception.

Table_4.55 Student's Reasons and Source of Knowledge (Biology)

Item No. 51	Stomata are present in animal cells.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	270(29.16)	50(18.51)	220(81.49)	656(70.84)	86(13.10)	570(86.90)
Source of Knowledge						
Books		37(74.00)	126(56.27)		52(60.47)	327(57.37)
Teachers		9(18.00)	72(32.73)		23(26.74)	240(42.11)
Peers		2(4.00)	12(5.45)		6(6.98)	1(0.18)
Parents		1(2.00)	2(0.91)		2(2.33)	1(0.18)
Observation/Experience		1(2.00)	8(3.63)		3(3.49)	1(0.18)

Graph_4.55 Student's Reasons and Source of Knowledge (Biology)



From table and graph 4.55 it is evident that regarding item No. 51 out of 926 students 270 (29.16%) students had given correct answers. Out of 270 (29.16%) students who had given correct answers 50 (18.51%) students had given correct reasoning while 220 (81.49%) students had given incorrect reasoning. Out of 50 (18.51%) students who had given correct reasoning 37 (74%) students considered books as their primary source of knowledge followed by teachers-9 (18%), peers-2 (4%), parents-1 (2%) and observation/experience-1 (2%). Out of 220 (81.49%) students who had given incorrect reasoning 126 (56.27%) students considered books as their primary source of knowledge followed by teachers-72 (32.73%), peers-12 (5.45%), parents-2 (0.91%) and observation/experience-8 (3.63%).

While out of 926 students 656 (70.84%) students had given incorrect answers. Out of 656 (70.84%) students who had given incorrect answers 86 (13.10%) students had given correct reasoning while 570 (86.90%) students had given incorrect reasoning. Out of 86 (13.10%) students who had given correct reasoning, 52 (60.47%) students considered books as their primary source of knowledge followed by teachers-23 (26.74 %), peers-6 (6.98%), parents-2 (2.33%) and observation/experience-3 (3.49 %). Out of 570 (86.90%) students who had given incorrect reasoning, 327 (57.37%) students considered books as their primary source of knowledge followed by teachers-240 (42.11 %), peers-1 (0.18%), parents-1 (0.18%) and observation/experience-1 (0.18%).

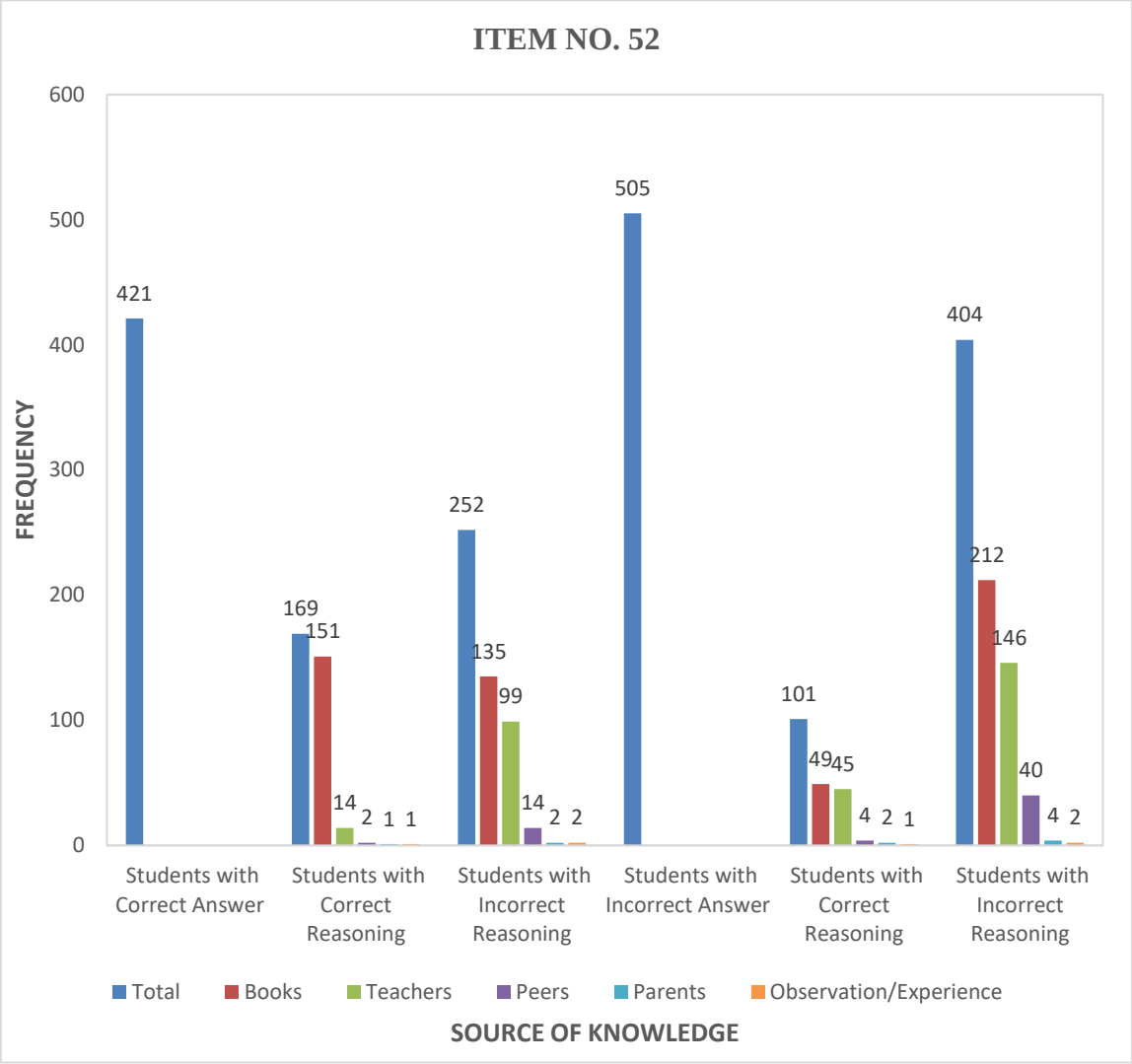
Out of 926 students 542 (58.53%) students considered books as their primary source of knowledge followed by teachers 344 (37.14%), peers 21 (2.26%), parents 6 (0.64%) and observations/experiences 13 (1.40%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 50 (5.39%) students had complete understanding of concept, 306 (33.05%) students had partial understanding of concept and 570 (61.56%) students had complete misunderstanding of concept or misconception.

Table_4.56 Student's Reasons and Source of Knowledge (Biology)

Item No. 52	Cell membrane is selectively permeable.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	421(45.46)	169(40.14)	252(59.86)	505(54.54)	101(20.00)	404(80.00)
Source of Knowledge						
Books		151(89.35	135(53.57)		49(48.51)	212(52.48)
Teachers		14(8.23)	99(39.29)		45(44.55)	146(36.14)
Peers		2(1.18)	14(5.56)		4(3.96)	40(9.90)
Parents		1(0.59)	2(0.79)		2(1.98)	4(0.99)
Observation/Experience		1(0.59)	2(0.79)		1(0.99)	2(0.50)

Graph_4.56 Student's Reasons and Source of Knowledge (Biology)



From table and graph 4.56 it is evident that regarding item No. 52 out of 926 students 421 (45.46%) students had given correct answers. Out of 421 (45.46%) students who had given correct answers 169 (40.14%) students had given correct reasoning while 252 (59.86%) students had given incorrect reasoning. Out of 169 (40.14%) students who had given correct reasoning 151 (89.35%) students considered books as their primary source of knowledge followed by teachers-14 (8.23%), peers-2 (1.18%), parents-1 (0.59%) and observation/experience-1 (0.59%). Out of 252 (59.86%) students who had given incorrect reasoning 135 (53.57%) students considered books as their primary source of knowledge followed by teachers-99 (39.29%), peers-14 (5.56%), parents-2 (0.79%) and observation/experience-2 (0.79%).

While out of 926 students 505 (54.54%) students had given incorrect answers. Out of 505 students who had given incorrect answers 101 (20%) students had given correct reasoning while 404 (80%) students had given incorrect reasoning. Out of 101 (20%) students who had given correct reasoning, 49 (48.51%) students considered books as their primary source of knowledge followed by teachers-45 (44.55%), peers-4 (3.96%), parents-2 (1.98%) and observation/experience-1 (0.99%). Out of 404 (80.00 %) students who had given incorrect reasoning, 212 (52.48%) students considered books as their primary source of knowledge followed by teachers-146 (36.14%), peers-40 (9.90%), parents-4 (0.99%) and observation/experience-2 (0.50%).

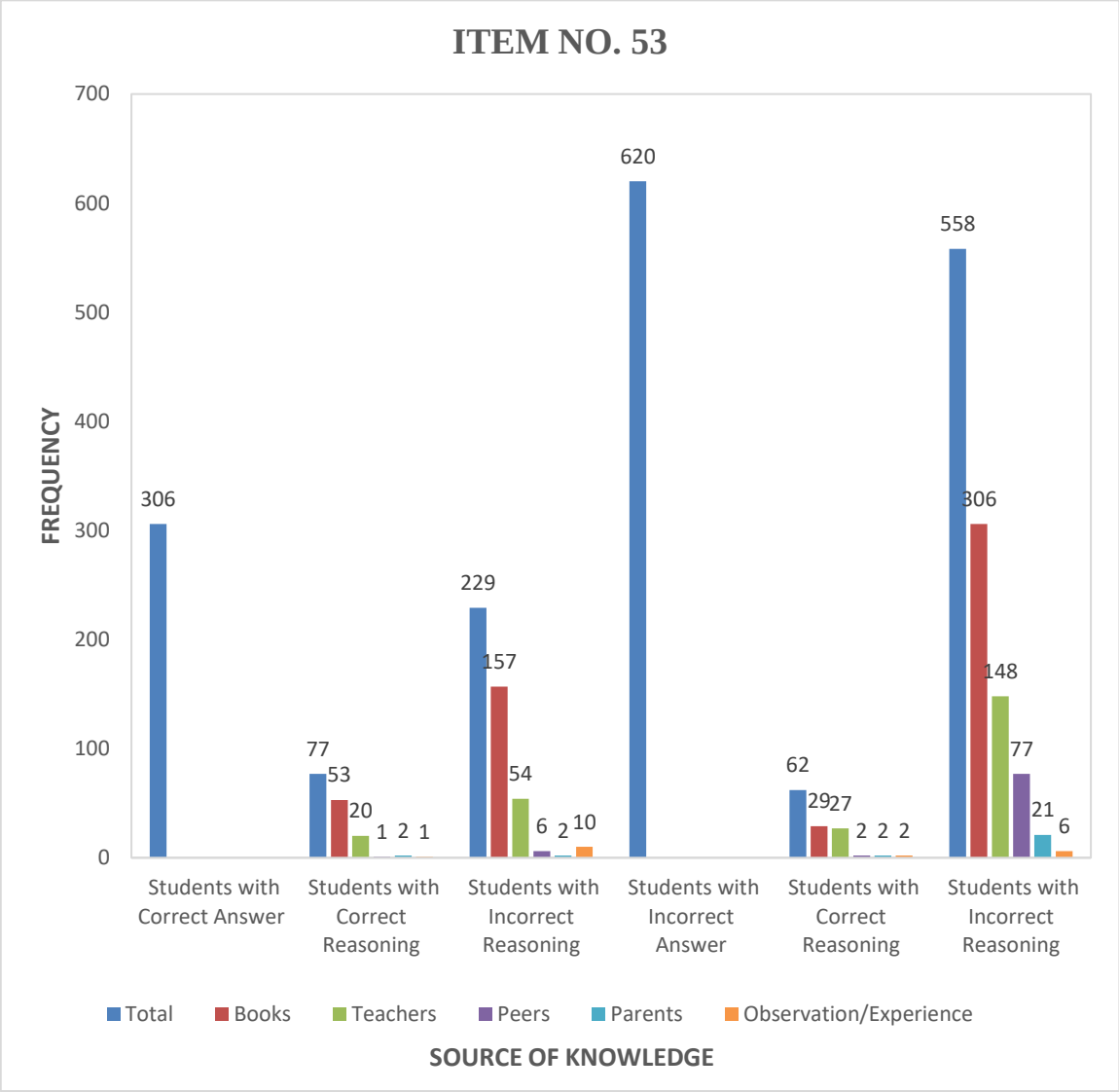
Out of 926 students 547 (59.09%) students considered books as their primary source of knowledge followed by teachers 304 (32.82%), peers 60 (6.47%), parents 9 (0.97%) and observations/experiences 6 (0.64%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 169 (18.25%) students had complete understanding of concept, 353 (38.12%) students had partial understanding of concept and 404 (43.63%) students had complete misunderstanding of concept or misconception.

Table_4.57 Student's Reasons and Source of Knowledge (Biology)

Item No. 53	Animal cells are well protected as they have thick cell wall.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	306(33.05)	77(25.16)	229(74.84)	620(66.95)	62(10.00)	558(90.00)
Source of Knowledge						
Books		53(68.83)	157(68.56)		29(46.77)	306(54.84)
Teachers		20(25.97)	54(23.58)		27(43.55)	148(26.52)
Peers		1(1.30)	6(2.62)		2(3.23)	77(13.80)
Parents		2(2.60)	2(0.87)		2(3.23)	21(3.76)
Observation/Experience		1(1.30)	10(4.37)		2(3.23)	6(1.08)

Graph_4.57 Student's Reasons and Source of Knowledge (Biology)



From table and graph 4.57 it is evident that regarding item No. 53 out of 926 students 306 (33.05%) students had given correct answers. Out of 306 (33.05%) students who had given correct answers 77 (25.16%) students had given correct reasoning while 229 (74.84%) students had given incorrect reasoning. Out of 77 (25.16%) students who had given correct reasoning 53 (68.83%) students considered books as their primary source of knowledge followed by teachers-20 (25.97%), peers-1 (1.30%), parents-2 (2.60%) and observation/experience-1 (1.30%). Out of 229 (74.84%) students who had given incorrect reasoning 157 (68.56%) students considered books as their primary source of knowledge followed by teachers-54 (23.58%), peers-6 (2.62%), parents-2 (0.87%) and observation/experience-10 (4.37%).

While out of 926 students 620 (66.95%) students had given incorrect answers. Out of 620 (66.95%) students who had given incorrect answers 62 (10%) students had given correct reasoning while 558 (90%) students had given incorrect reasoning. Out of 62 (10%) students who had given correct reasoning, 29 (46.77%) students considered books as their primary source of knowledge followed by teachers-27 (43.55%), peers-2 (3.23%), parents-2 (3.23%) and observation/experience-2 (3.23%). Out of 558 (90.00 %) students who had given incorrect reasoning, 306 (54.84%) students considered books as their primary source of knowledge followed by teachers-148 (26.52%), peers-77 (13.80%), parents-21 (3.76%) and observation/experience-6 (1.08%).

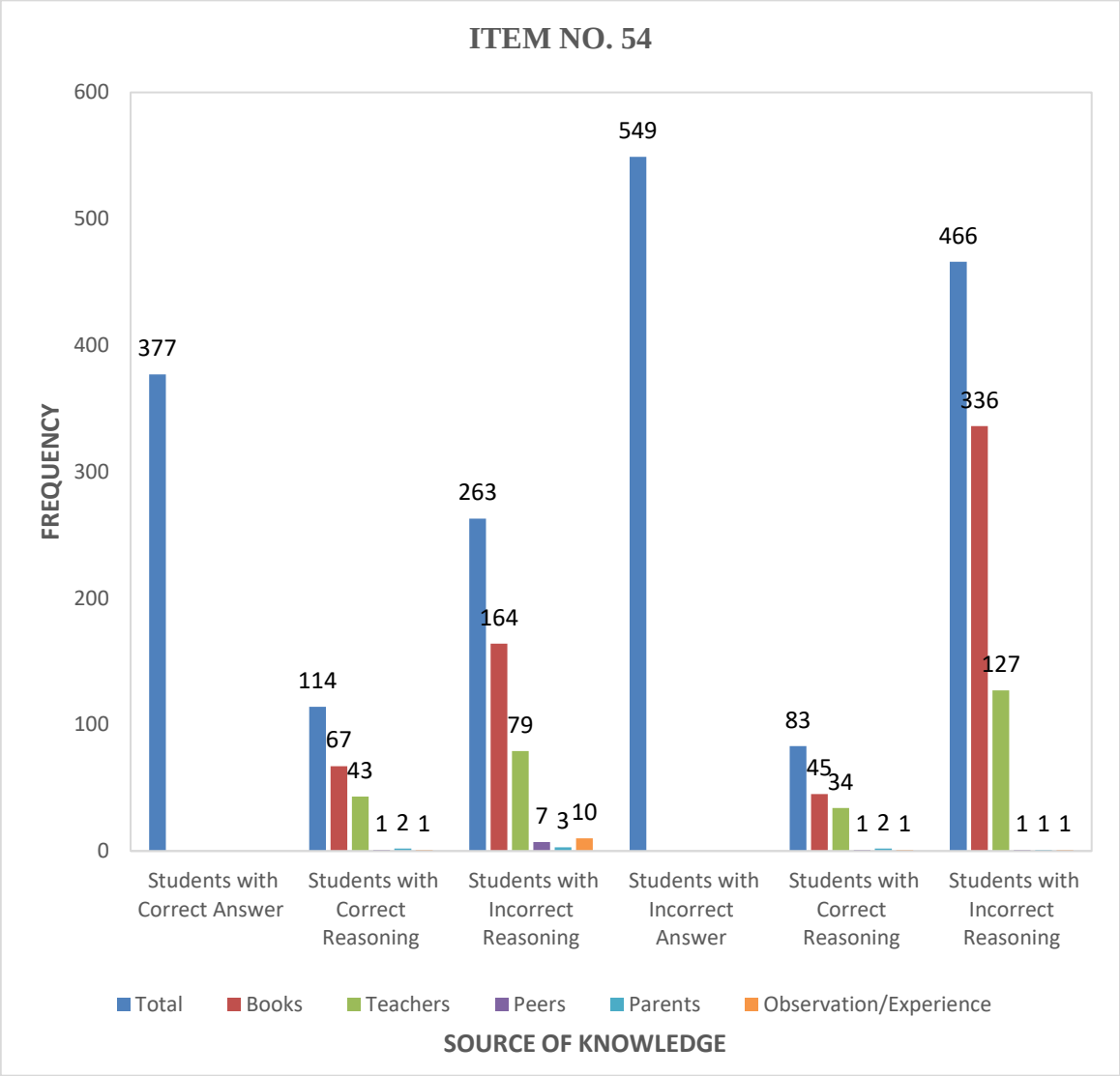
Out of 926 students 545 (58.85%) students considered books as their primary source of knowledge followed by teachers 249 (26.88%), peers 86 (9.28%), parents 27 (2.91%) and observations/experiences 19 (2.05%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 77 (8.32%) students had complete understanding of concept, 291 (31.43%) students had partial understanding of concept and 558 (60.25%) students had complete misunderstanding of concept or misconception.

Table_4.58 Student's Reasons and Source of Knowledge (Biology)

Item No. 54	Gene is the unit of inheritance in living organism.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	377(40.71)	114(30.23)	263(69.77)	549(59.29)	83(15.11)	466(84.89)
Source of Knowledge						
Books		67(62.36)	164(62.36)		45(54.22)	336(72.10)
Teachers		43(37.72)	79(30.04)		34(40.96)	127(27.25)
Peers		1(0.88)	7(2.66)		1(1.20)	1(0.21)
Parents		2(1.75)	3(1.14)		2(2.41)	1(0.21)
Observation/Experience		1(0.88)	10(3.80)		1(1.20)	1(0.21)

Graph_4.58 Student's Reasons and Source of Knowledge (Biology)



From table and graph 4.58 it is evident that regarding item No. 54 out of 926 students 377 (40.71%) students had given correct answers. Out of 377 (40.71%) students who had given correct answers 114 (30.23%) students had given correct reasoning while 263 (69.77%) students had given incorrect reasoning. Out of 114 (30.23%) students who had given correct reasoning 67 (62.36%) students considered books as their primary source of knowledge followed by teachers-43 (37.72%), peers-1 (0.88%), parents-2 (1.75%) and observation/experience-1 (0.88%). Out of 263 (69.77 %) students who had given incorrect reasoning 164 (62.36%) students considered books as their primary source of knowledge followed by teachers-79 (30.04%), peers-7 (2.66%), parents-3 (1.14%) and observation/experience-10 (3.80%).

While out of 926 students 549 (59.29%) students had given incorrect answers. Out of 549 (59.29%) students who had given incorrect answers 83 (15.11%) students had given correct reasoning while 466 (84.89%) students had given incorrect reasoning. Out of 83 (15.11%) students who had given correct reasoning, 45 (54.22%) students considered books as their primary source of knowledge followed by teachers-34 (40.96%), peers-1 (1.20%), parents-2 (2.41%) and observation/experience-1 (1.20%). Out of 466 (84.89 %) students who had given incorrect reasoning, 336 (72.10%) students considered books as their primary source of knowledge followed by teachers-127 (27.25%), peers-1 (0.21%), parents-1(0.21%) and observation/experience-1 (0.21%).

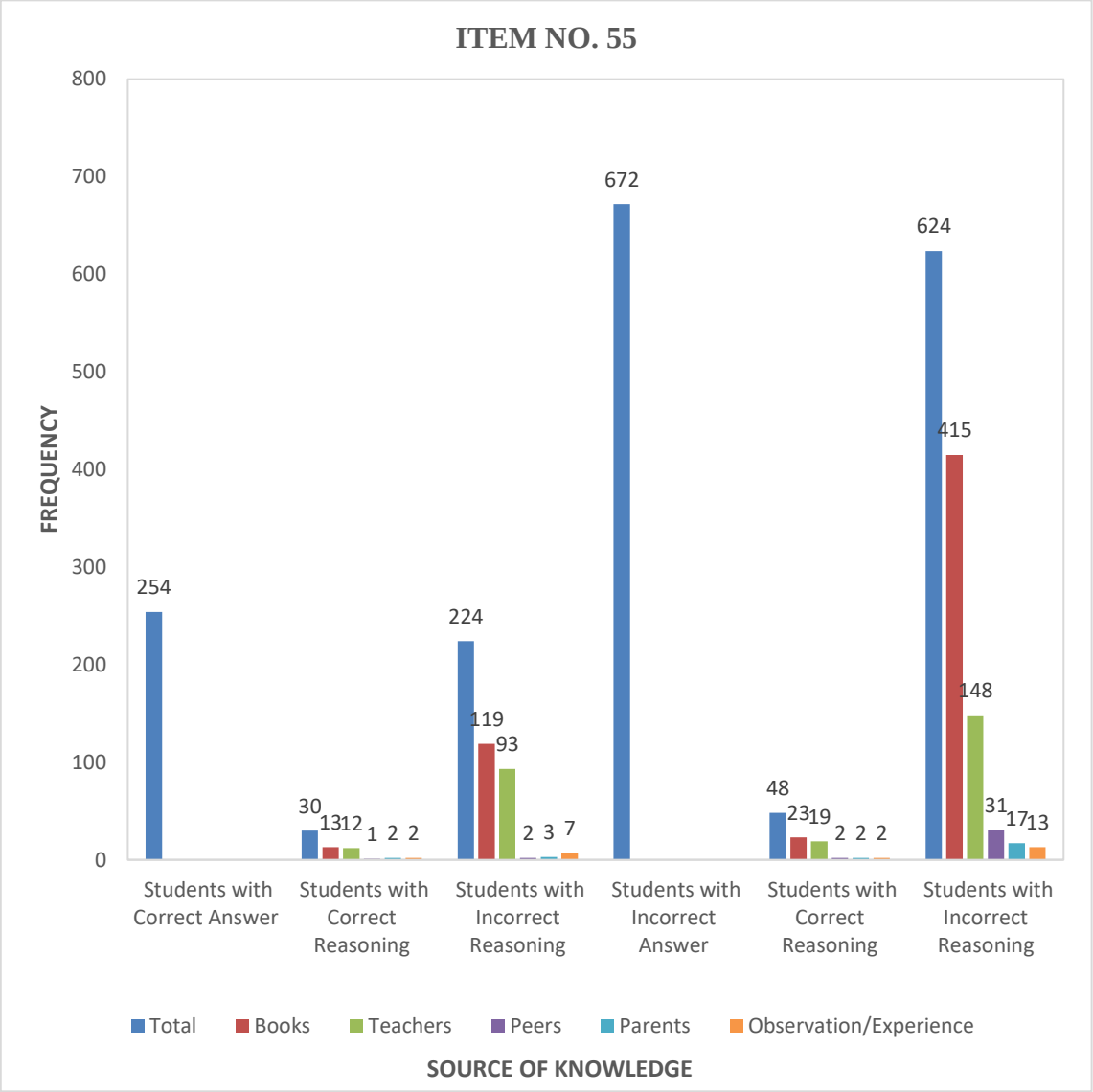
Out of 926 students 612 (66.09 %) students considered books as their primary source of knowledge followed by teachers 283 (30.56%), peers 10 (1.07%), parents 8 (0.86%) and observations/experiences 13 (1.40%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 114 (12.31%) students had complete understanding of concept, 346 (37.36%) students had partial understanding of concept and 466 (50.33%) students had complete misunderstanding of concept or misconception.

Table_4.59 Student's Reasons and Source of Knowledge (Biology)

Item No. 55	Organism grows bigger when their cells grow bigger.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	254(27.43)	30(11.81)	224(88.19)	672(72.57)	48(7.14)	624(92.86)
Source of Knowledge						
Books		13(43.33)	119(53.13)		23(47.92)	415(66.51)
Teachers		12(40.00)	93(41.52)		19(39.58)	148(23.72)
Peers		1(3.33)	2(0.89)		2(4.17)	31(4.97)
Parents		2(6.67)	3(1.34)		2(4.17)	17(2.72)
Observation /Experience		2(6.67)	7(3.13)		2(4.17)	13(2.08)

Graph_4.59 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.59 it is evident that regarding item No. 55 out of 926 students 254 (27.43%) students had given correct answers. Out of 254 (27.43%) students who had given correct answers 30 (11.81%) students had given correct reasoning while 224 (88.19%) students had given incorrect reasoning. Out of 30 (11.81%) students who had given correct reasoning 13 (43.33%) students considered books as their primary source of knowledge followed by teachers-12 (40%), peers-1 (3.33%), parents-2 (6.67%) and observation/experience-2 (6.67%). Out of 224 (88.19%) students who had given incorrect reasoning 119 (53.13%) students considered books as their primary source of knowledge followed by teachers-93 (41.52%), peers-2 (0.89 %), parents-3 (1.34 %) and observation/experience-7 (3.13%).

While out of 926 students 672 (72.57%) students had given incorrect answers. Out of 672 (72.57%) students who had given incorrect answers 48 (7.14%) students had given correct reasoning while 624 (92.86%) students had given incorrect reasoning. Out of 48 (7.14%) students who had given correct reasoning, 23 (47.92%) students considered books as their primary source of knowledge followed by teachers-19 (39.58%), peers-2 (4.17%), parents-2 (4.17%) and observation/experience-2 (4.17%). Out of 624 (92.86 %) students who had given incorrect reasoning, 415 (66.51%) students considered books as their primary source of knowledge followed by teachers-148 (23.72%), peers-31 (4.97 %), parents-17 (2.72%) and observation/experience-13 (2.08%).

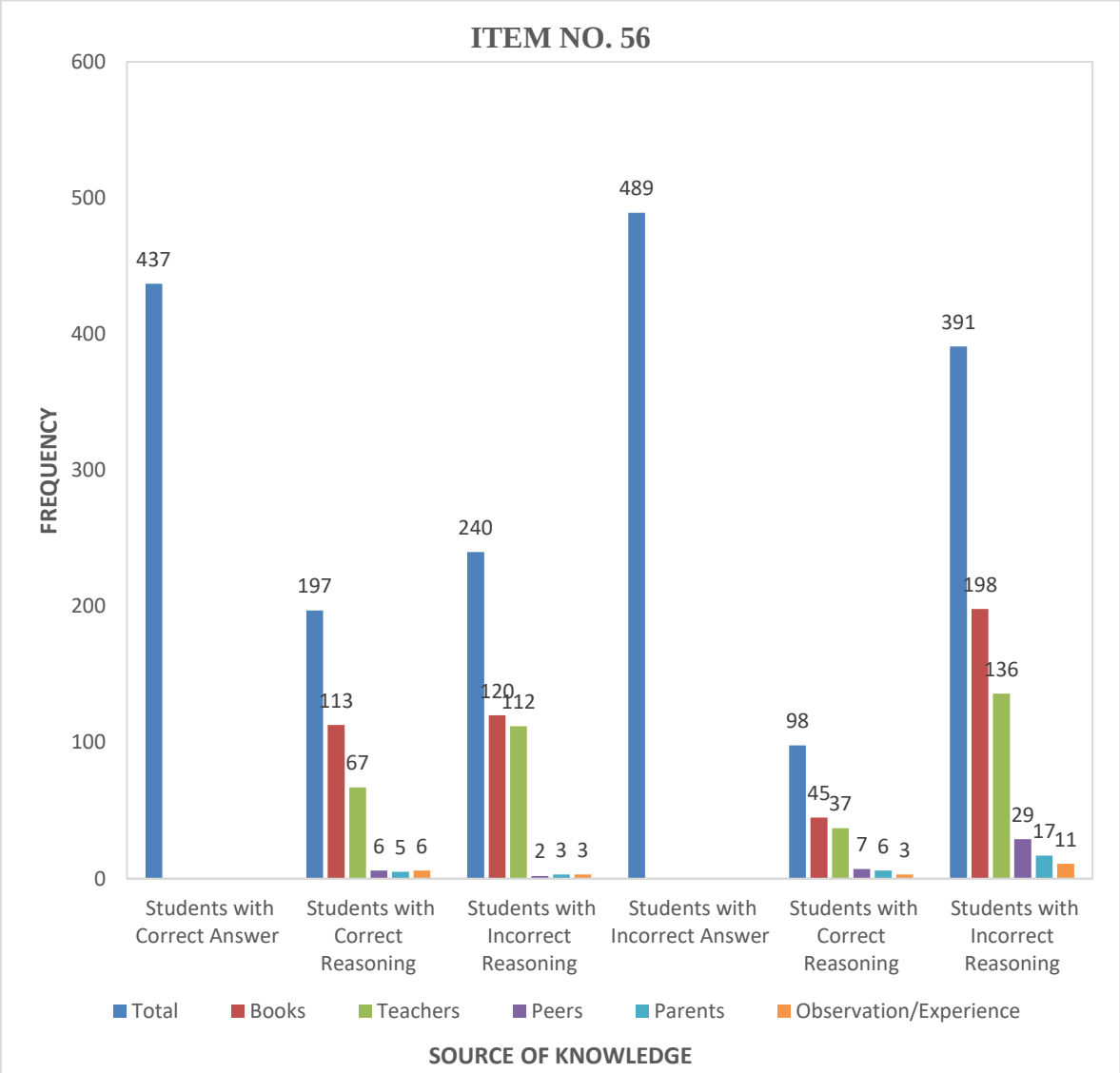
Out of 926 students 570 (61.55%) students considered books as their primary source of knowledge followed by teachers 272 (29.37%), peers 36 (3.88%), parents 24 (2.59%) and observations/experiences 24 (2.59%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 30 (3.23%) students had complete understanding of concept, 272 (29.38%) students had partial understanding of concept and 466 (67.39%) students had complete misunderstanding of concept or misconception.

Table_4.60 Student's Reasons and Source of Knowledge (Biology)

Item No. 56	Protoplasm is called the on-living substance of the cell.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	437(47.19)	197(45.08)	240(54.92)	489(52.81)	98(20.04)	391(79.96)
Source of Knowledge						
Books		113(57.36)	120(50.00)		45(45.92)	198(50.64)
Teachers		67(34.01)	112(46.67)		37(37.76)	136(34.78)
Peers		6(3.05)	2(0.83)		7(7.14)	29(7.42)
Parents		5(2.54)	3(1.25)		6(6.12)	17(4.35)
Observation /Experience		6(3.05)	3(1.25)		3(3.06)	11(2.81)

Graph_4.60 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.60 it is evident that regarding item No. 56 out of 926 students 437 (47.19%) students had given correct answers. Out of 437 (47.19%) students who had given correct answers 197 (45.08%) students had given correct reasoning while 240 (54.92%) students had given incorrect reasoning. Out of 197 (45.08%) students who had given correct reasoning 113 (57.36%) students considered books as their primary source of knowledge followed by teachers-67 (34.01%), peers-6 (3.05%), parents-5 (2.54%) and observation/experience-6 (3.05%). Out of 240 (54.92%) students who had given incorrect reasoning 120 (50%) students considered books as their primary source of knowledge followed by teachers-112 (46.67%), peers-2 (0.83%), parents-3 (1.25%) and observation/experience-3 (1.25%).

While out of 926 students 489 (52.81%) students had given incorrect answers. Out of 489 (52.81%) students who had given incorrect answers 98 (20.04%) students had given correct reasoning while 391 (79.96%). students had given incorrect reasoning. Out of 98 (20.04%) students who had given correct reasoning, 45 (45.92%) students considered books as their primary source of knowledge followed by teachers-37 (37.76%), peers-7 (7.14%), parents-6 (6.12%) and observation/experience-3 (3.06%). Out of 391 (79.96 %) students who had given incorrect reasoning, 198 (50.64%) students considered books as their primary source of knowledge followed by teachers-136 (34.78%), peers-29 (7.42%), parents-17 (4.35%) and observation/experience-11 (2.81%).

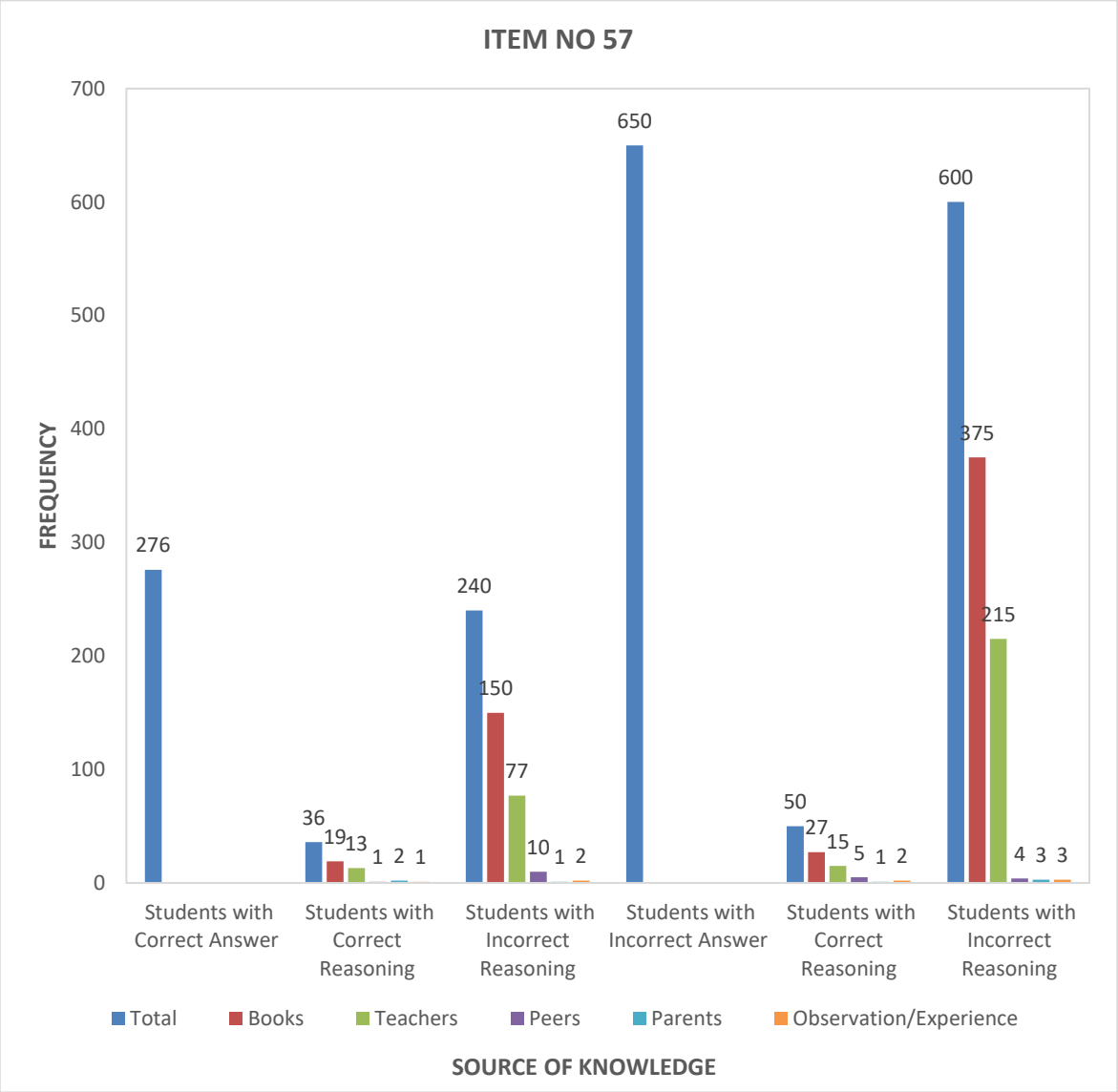
Out of 926 students 476 (51.40%) students considered books as their primary source of knowledge followed by teachers 352 (38.10 %), peers 44 (4.75%), parents 31 (3.34%) and observations/experiences 23 (2.48%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 197 (21.28%) students had complete understanding of concept, 338 (36.50%) students had partial understanding of concept and 391 (42.22%) students had complete misunderstanding of concept or misconception.

Table_4.61 Student's Reasons and Source of Knowledge (Biology)

Item No. 57	Chromosomes are responsible for transfer of hereditary characters.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	276(29.81)	36(13.04)	240(86.96)	650(70.19)	50(7.70)	600(92.30)
Source of Knowledge						
Books		19(52.78)	150(62.50)		27(54.00)	375(62.50)
Teachers		13(36.11)	77(32.08)		15(30.00)	215(35.83)
Peers		1(2.78)	10(4.17)		5(10.00)	4(0.67)
Parents		2(5.56)	1(0.42)		1(2.00)	3(0.50)
Observation /Experience		1(2.78)	2(0.83)		2(4.00)	3(0.50)

Graph_4.61 Student's Reasons and Source of Knowledge (Biology)



From table and graph 4.61 it is evident that regarding item No. 57 out of 926 students 276 (29.81%) students had given correct answers. Out of 276 (29.81%) students who had given correct answers 36 (13.04%) students had given correct reasoning while 240 (86.96%) students had given incorrect reasoning. Out of 36 (13.04%) students who had given correct reasoning 19 (52.78%) students considered books as their primary source of knowledge followed by teachers-13 (36.11%), peers-1 (2.78%), parents-2 (5.56%) and observation/experience-1 (2.78%). Out of 240 (86.96 %) students who had given incorrect reasoning 150 (62.50%) students considered books as their primary source of knowledge followed by teachers-77 (32.08%), peers-10 (4.17%), parents-1(0.42%) and observation/experience-2 (0.83%).

While out of 926 students 650 (70.19%) students had given incorrect answers. Out of 650 (70.19%) students who had given incorrect answers 50 (7.70%) students had given correct reasoning while 600 (92.30%) students had given incorrect reasoning. Out of 50 (7.70%) students who had given correct reasoning, 27 (54%) students considered books as their primary source of knowledge followed by teachers-15 (30.00 %), peers-5 (10.00 %), parents-1 (2%) and observation/experience-2 (4%). Out of 600 (92.30%) students who had given incorrect reasoning, 375 (62.50%) students considered books as their primary source of knowledge followed by teachers-215 (35.83%), peers-4 (0.67%), parents-3 (0.50%) and observation/experience-3 (0.50%).

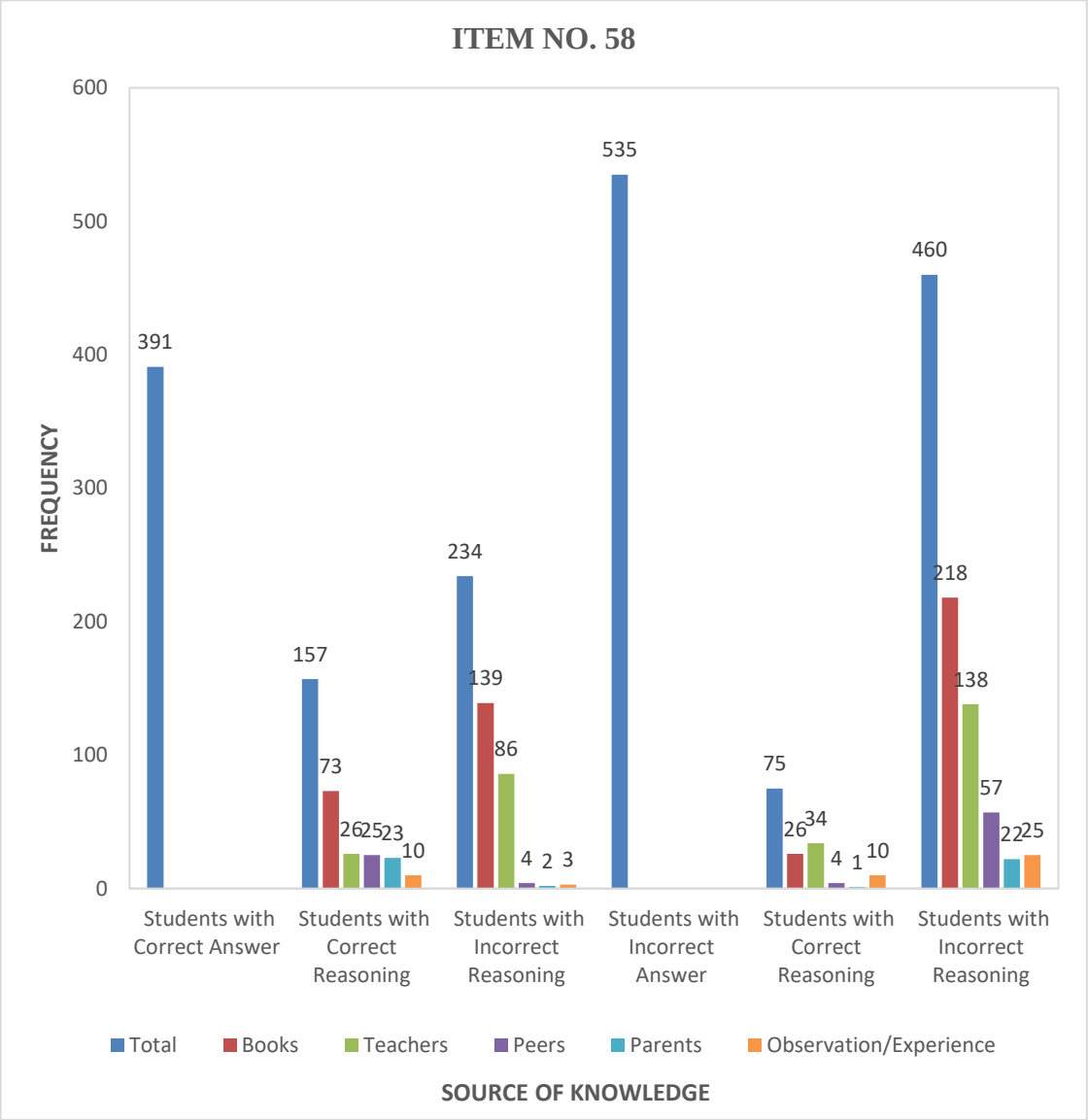
Out of 926 students 571 (61.66%) students considered books as their primary source of knowledge followed by teachers 320 (34.55%), peers 20 (2.15%), parents 7 (0.75%) and observations/experiences 8 (0.88%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 36 (3.89%) students had complete understanding of concept, 290 (31.32%) students had partial understanding of concept and 600 (64.79%) students had complete misunderstanding of concept or misconception.

Table_4.62 Student's Reasons and Source of Knowledge (Biology)

Item No. 58	The nucleus of an eukaryotic cell is made up of cytoplasm.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	391(42.22)	157(40.15)	234(59.85)	535(57.78)	75(14.01)	460(85.99)
Source of Knowledge						
Books		73(46.50)	139(59.40)		26(34.67)	218(47.39)
Teachers		26(16.56)	86(36.75)		34(45.33)	138(30.00)
Peers		25(15.92)	4(1.71)		4(5.33)	57(12.39)
Parents		23(14.65)	2(0.85)		1(1.33)	22(4.78)
Observation /Experience		10(6.37)	3(1.28)		10(13.33)	25(5.43)

Graph_4.62 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.62 it is evident that regarding item No. 58 out of 926 students 391 (42.22%) students had given correct answers. Out of 391 (42.22%) students who had given correct answers 157 (40.15%) students had given correct reasoning while 234 (59.85%) students had given incorrect reasoning. Out of 157 (40.15%) students who had given correct reasoning 73 (46.05%) students considered books as their primary source of knowledge followed by teachers-26 (16.56%) peers-25 (15.92%), parents-23 (14.65 %) and observation/experience-10 (6.37%). Out of 234 (59.85%) students who had given incorrect reasoning 139 (59.40%) students considered books as their primary source of knowledge followed by teachers-86 (36.75%), peers-4 (1.71%), parents-2 (0.85%) and observation/experience-3 (1.28%).

While out of 926 students 535 (57.78%) students had given incorrect answers. Out of 535 (57.78%) students who had given incorrect answers 75 (14.01%) students had given correct reasoning while 460 (85.99%) students had given incorrect reasoning. Out of 75 (14.01%) students who had given correct reasoning, 26 (34.67%) students considered books as their primary source of knowledge followed by teachers-34 (45.33%), peers-4 (5.33%), parents-1 (1.33%) and observation/experience-10 (13.33%). Out of 460 (85.99 %) students who had given incorrect reasoning, 218 (47.39%) students considered books as their primary source of knowledge followed by teachers-138 (30%), peers-57 (12.39%), parents-22 (4.78%) and observation/experience-25 (5.43%).

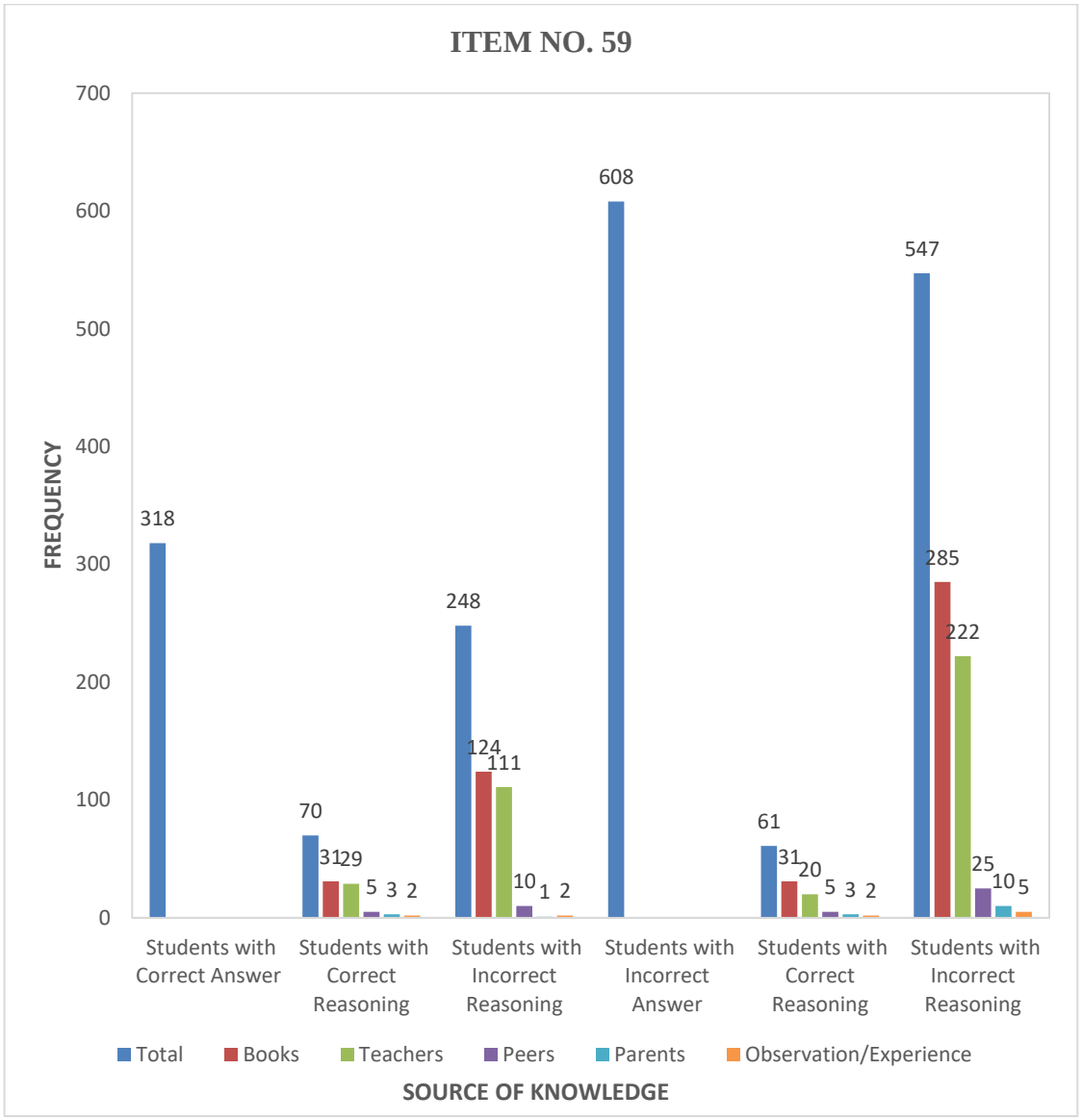
Out of 926 students 456 (49.24%) students considered books as their primary source of knowledge followed by teachers 284 (30.66%), peers 90 (9.71%), parents 48 (5.18%) and observations/experiences 48 (5.18%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 157 (16.96%) students had complete understanding of concept, 309 (33.37%) students had partial understanding of concept and 460 (49.67%) students had complete misunderstanding of concept or misconception.

Table_4.63 Student's Reasons and Source of Knowledge (Biology)

Item No. 59	**Hen's egg is a single cell.**					
	Correct Answers			**Incorrect Answers**		
Total Students	**Frequency & (%) of Students with Correct Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**	**Frequency & (%) of Students with Incorrect Answer**	**Frequency & (%) of Students with Correct Reasoning**	**Frequency & (%) of Students with Incorrect Reasoning**
926	**318(34.34)**	**70(22.02)**	**248(77.98)**	**608(65.66)**	**61(10.03)**	**547(89.97)**
Source of Knowledge						
Books		**31(44.29)**	**124(50.00)**		**31(50.82)**	**285(52.10)**
Teachers		**29(41.43)**	**111(44.76)**		**20(32.79)**	**222(40.59)**
Peers		**5(7.14)**	**10(4.03)**		**5(8.20)**	**25(4.57)**
Parents		**3(4.29)**	**1(0.40)**		**3(4.92)**	**10(1.83)**
Observation /Experience		**2(2.86)**	**2(0.81)**		**2(3.28)**	**5(0.91)**

Graph_4.63 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.63 it is evident that regarding item No. 59 out of 926 students 318 (34.34 %) students had given correct answers. Out of 318 (34.34%) students who had given correct answers 70 (22.02%) students had given correct reasoning while 248 (77.98%) students had given incorrect reasoning. Out of 70 (22.02%) students who had given correct reasoning 31 (44.29%) students considered books as their primary source of knowledge followed by teachers-29 (41.43%), peers-5 (7.14%), parents-3 (4.29%) and observation/experience-2 (2.86%). Out of 248 (77.98%) students who had given incorrect reasoning 124 (50%) students considered books as their primary source of knowledge followed by teachers-111 (44.76%), peers-10 (4.03%), parents-1 (0.40%) and observation/experience-2 (0.81%).

While out of 926 students 608 (65.66%) students had given incorrect answers. Out of 608 (65.66%) students who had given incorrect answers 61 (10.03%) students had given correct reasoning while 547 (89.97%) students had given incorrect reasoning. Out of 61 students who had given correct reasoning, 31 (50.82%) students considered books as their primary source of knowledge followed by teachers-20 (32.79%), peers-5 (8.20%), parents-3 (4.92%) and observation/experience-2 (3.28%). Out of 547 (89.97%) students who had given incorrect reasoning, 285 (52.10%) students considered books as their primary source of knowledge followed by teachers-222 (40.59%), peers-25 (4.57%), parents-10 (1.83%) and observation/experience-5 (0.91%).

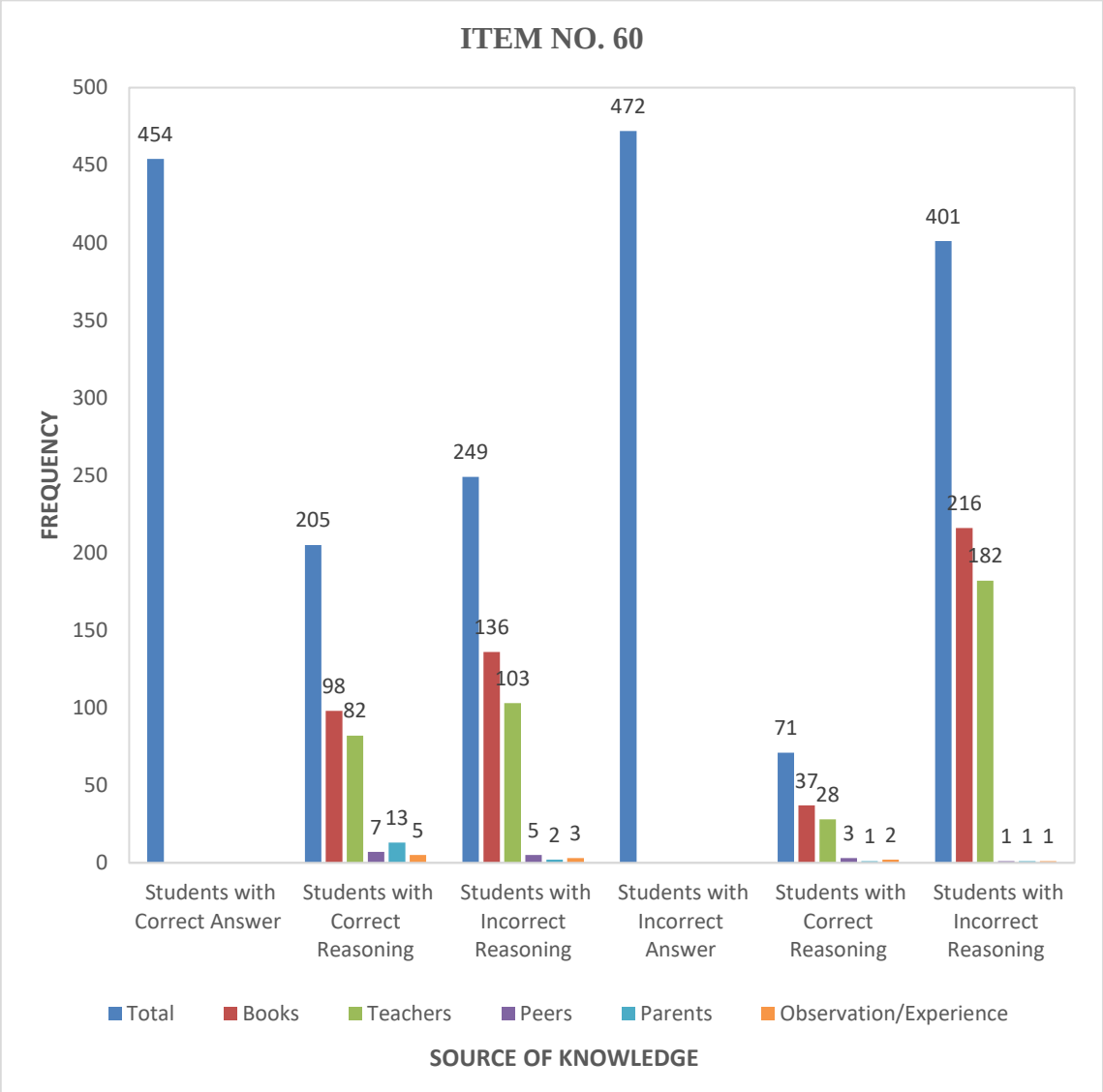
Out of 926 students 471 (50.86%) students considered books as their primary source of knowledge followed by teachers 382 (41.25%), peers 45 (4.85%), parents 17 (1.83%) and observations/experiences 11 (1.18%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 70 (7.55%) students had complete understanding of concept, 309 (33.36%) students had partial understanding of concept and 547 (59.09%) students had complete misunderstanding of concept or misconception.

Table_4.64 Student's Reasons and Source of Knowledge (Biology)

Item No. 60	Cell wall is present in both plant and animal cell.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	454(49.03)	205(45.15)	249(54.85)	472(50.97)	71(15.05)	401(84.95)
Source of Knowledge						
Books		98(47.80)	136(54.62)		37(52.11)	216(53.87)
Teachers		82(40.00)	103(41.37)		28(39.44)	182(45.39)
Peers		7(3.41)	5(2.01)		3(4.23)	1(0.25)
Parents		13(6.34)	2(0.80)		1(1.41)	1(0.25)
Observation /Experience		5(2.44)	3(1.20)		2(2.82)	1(0.25)

Graph_4.64 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.64 it is evident that regarding item No. 60 out of 926 students 454 (49.03%) students had given correct answers. Out of 454 (49.03%) students who had given correct answers 205 (45.15%) students had given correct reasoning while 249 (54.85%) students had given incorrect reasoning. Out of 205 (45.15%) students who had given correct reasoning 98 (47.80%) students considered books as their primary source of knowledge followed by teachers-82 (40%), peers-7 (3.41%), parents-13 (6.34%) and observation/experience-5 (2.44%). Out of 249 (54.85%) students who had given incorrect reasoning 136 (54.62%) students considered books as their primary source of knowledge followed by teachers-103 (41.37%), peers-5 (2.01%), parents-2 (0.80%) and observation/experience-3 (1.20%).

While out of 926 students 472 (50.97%) students had given incorrect answers. Out of 472 (50.97%) students who had given incorrect answers 71 (15.05%) students had given correct reasoning while 401 (84.95%) students had given incorrect reasoning. Out of 71 (15.05 %) students who had given correct reasoning, 37 (52.11%) students considered books as their primary source of knowledge followed by teachers-28 (39.44%), peers-3 (4.23%), parents-1 (1.41%) and observation/experience-2 (2.82%). Out of 401 (84.95 %) students who had given incorrect reasoning, 216 (53.87%) students considered books as their primary source of knowledge followed by teachers-182 (45.39%), peers-1 (0.25%), parents-1 (0.25%) and observation/experience-1 (0.25%).

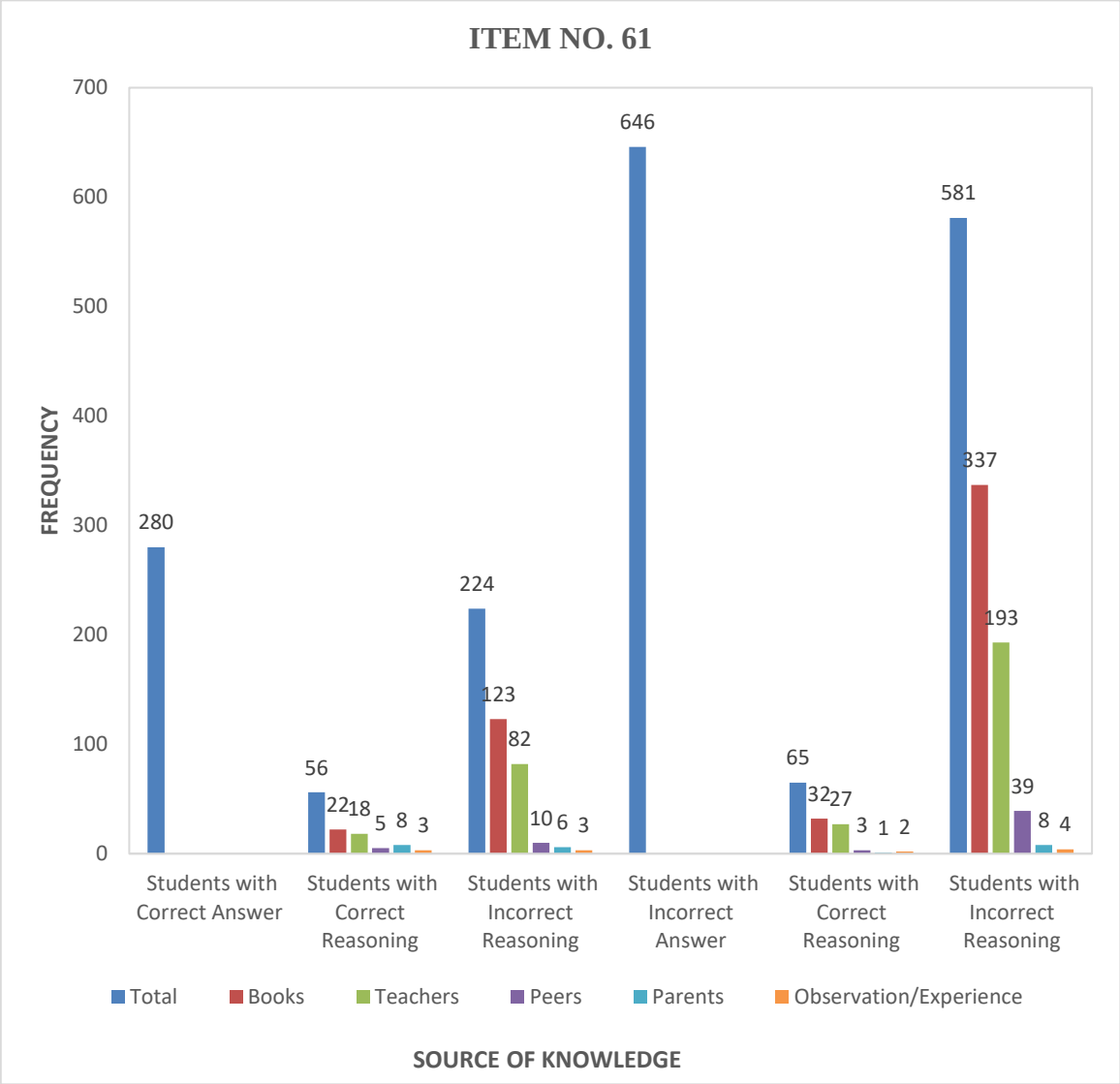
Out of 926 students 487 (52.59 %) students considered books as their primary source of knowledge followed by teachers 395 (42.65 %), peers 16 (1.72 %), parents 17 (1.83 %) and observations/experiences 11 (1.18 %). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 205 (22.13 %) students had complete understanding of concept, 320 (34.55 %) students had partial understanding of concept and 547 (43.32 %) students had complete misunderstanding of concept or misconception.

Table_4.65 Student's Reasons and Source of Knowledge (Biology)

Item No. 61	Pseudopodia are the eyes of amoeba.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	280(30.24)	56(20.00)	224(80.00)	646(69.76)	65(10.06)	581(89.94)
Source of Knowledge						
Books		22(39.29)	123(54.91)		32(49.23)	337(58.00)
Teachers		18(32.14)	82(36.61)		27(41.54)	193(33.22)
Peers		5(8.93)	10(4.46)		3(4.62)	39(6.71)
Parents		8(14.29)	6(2.68)		1(1.54)	8(1.38)
Observation /Experience		3(5.36)	3(1.34)		2(3.08)	4(0.69)

Graph_4.65 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.65 it is evident that regarding item No. 61 out of 926 students 280 (30.24%) students had given correct answers. Out of 280 (30.24%) students who had given correct answers 56 (20%) students had given correct reasoning while 224 (80%) students had given incorrect reasoning. Out of 56 (20%) students who had given correct reasoning 22 (39.29%) students considered books as their primary source of knowledge followed by teachers-18 (32.14%), peers-5 (8.93%), parents-8 (14.29%) and observation/experience-3 (5.36%). Out of 224 (80%) students who had given incorrect reasoning 123 (54.91%) students considered books as their primary source of knowledge followed by teachers-82 (36.61%), peers-10 (4.46%), parents-6 (2.68%) and observation/experience-3 (1.34%).

While out of 926 students 646 (69.76%) students had given incorrect answers. Out of 646 (69.76%) students who had given incorrect answers 65 (10.06%) students had given correct reasoning while 581(89.94%) students had given incorrect reasoning. Out of 65 (10.06%) students who had given correct reasoning, 32 (49.23%) students considered books as their primary source of knowledge followed by teachers-27 (41.54%), peers-3 (4.62%), parents-1 (1.54%) and observation/experience-2 (3.08%). Out of 581 (89.94 %) students who had given incorrect reasoning, 337 (58%) students considered books as their primary source of knowledge followed by teachers-193 (33.22%), peers-39 (6.71 %), parents-8 (1.38%) and observation/experience-4 (0.69%).

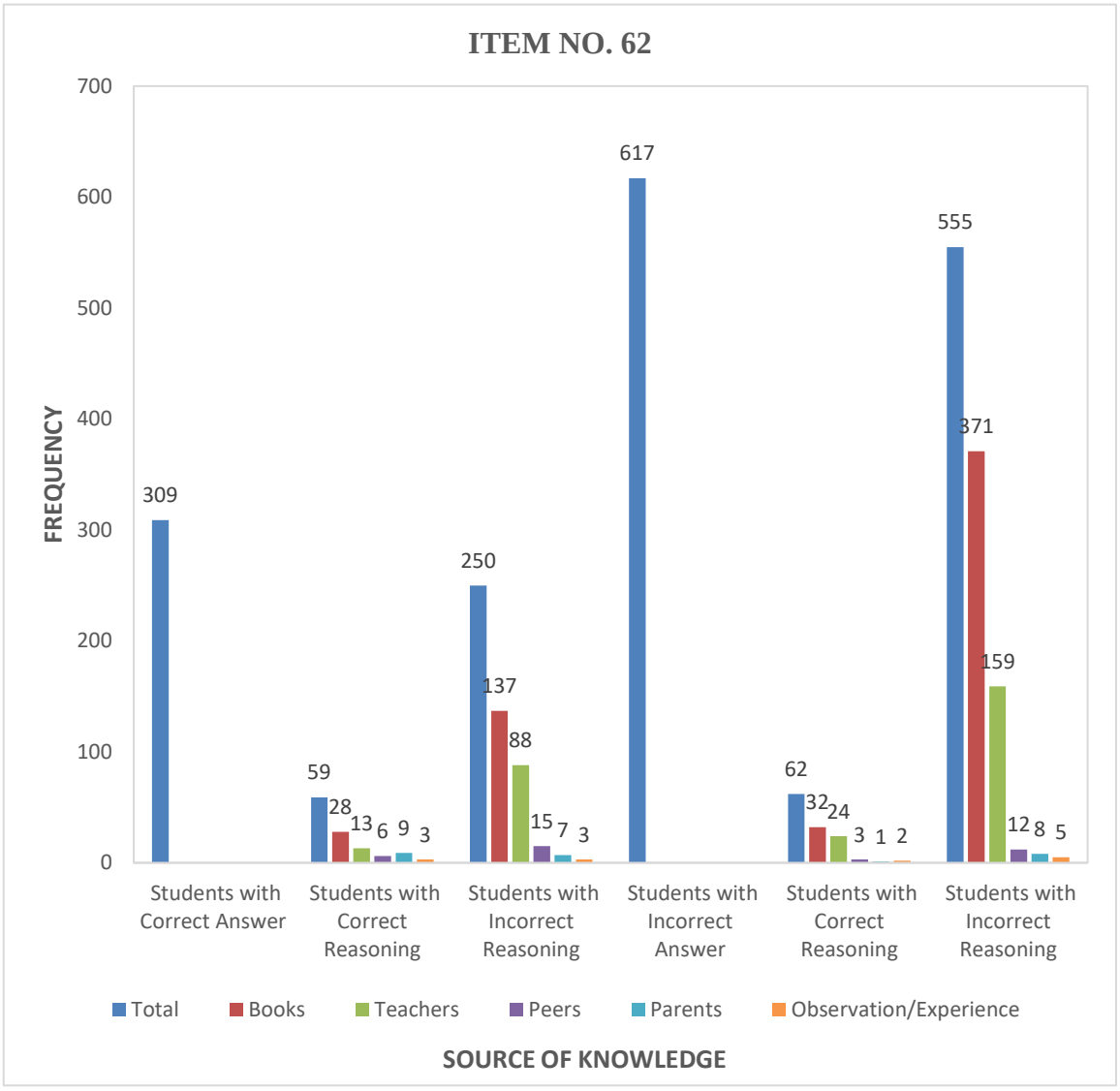
Out of 926 students 514 (55.50%) students considered books as their primary source of knowledge followed by teachers 320 (34.55%), peers 57 (6.15%), parents 23 (2.48%) and observations/experiences 12 (1.29%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 56 (6.04%) students had complete understanding of concept, 289 (31.22%) students had partial understanding of concept and 581 (62.74%) students had complete misunderstanding of concept or misconception.

Table_4.66 Student's Reasons and Source of Knowledge (Biology)

Item No. 62	Nerve cell is the longest cell in human body.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	309(33.37)	59(19.09)	250(80.10)	617(66.73)	62(10.04)	555(89.96)
Source of Knowledge						
Books		28(47.46)	137(54.80)		32(51.61)	371(66.85)
Teachers		13(22.03)	88(32.20)		24(38.71)	159(28.65)
Peers		6(10.17)	15(6.00)		3(4.84)	12(2.16)
Parents		9(15.25)	7(2.80)		1(1.61)	8(1.44)
Observation /Experience		3(5.08)	3(1.20)		2(3.23)	5(0.90)

Graph_4.66 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.66 it is evident that regarding item No. 62 out of 926 students 309 (33.37%) students had given correct answers. Out of 309 (33.37%) students who had given correct answers 59 (19.09%) students had given correct reasoning while 250 (80.10%) students had given incorrect reasoning. Out of 59 (19.09%) students who had given correct reasoning 28 (47.46%) students considered books as their primary source of knowledge followed by teachers-13 (22.03%), peers-6 (10.17%), parents-9 (15.25%) and observation/experience-3 (5.08%). Out of 250 (80.10%) students who had given incorrect reasoning 137 (54.80%) students considered books as their primary source of knowledge followed by teachers-88 (32.20 %), peers-15 (6 %), parents-7 (2.80%) and observation/experience-3 (1.20%).

While out of 926 students 617 (66.73%) students had given incorrect answers. Out of 617 (66.73%) students who had given incorrect answers 62 (10.04%) students had given correct reasoning while 555 (89.96%) students had given incorrect reasoning. Out of 62 (10.04 %) students who had given correct reasoning, 32 (51.61%) students considered books as their primary source of knowledge followed by teachers-24 (38.71%), peers-3 (4.84%), parents-1(1.61%) and observation/experience-2 (3.23%). Out of 555 (89.96 %) students who had given incorrect reasoning, 371 (66.85%) students considered books as their primary source of knowledge followed by teachers-159 (28.65%), peers-12 (2.16 %), parents-8 (1.44%) and observation/experience-5 (0.90%).

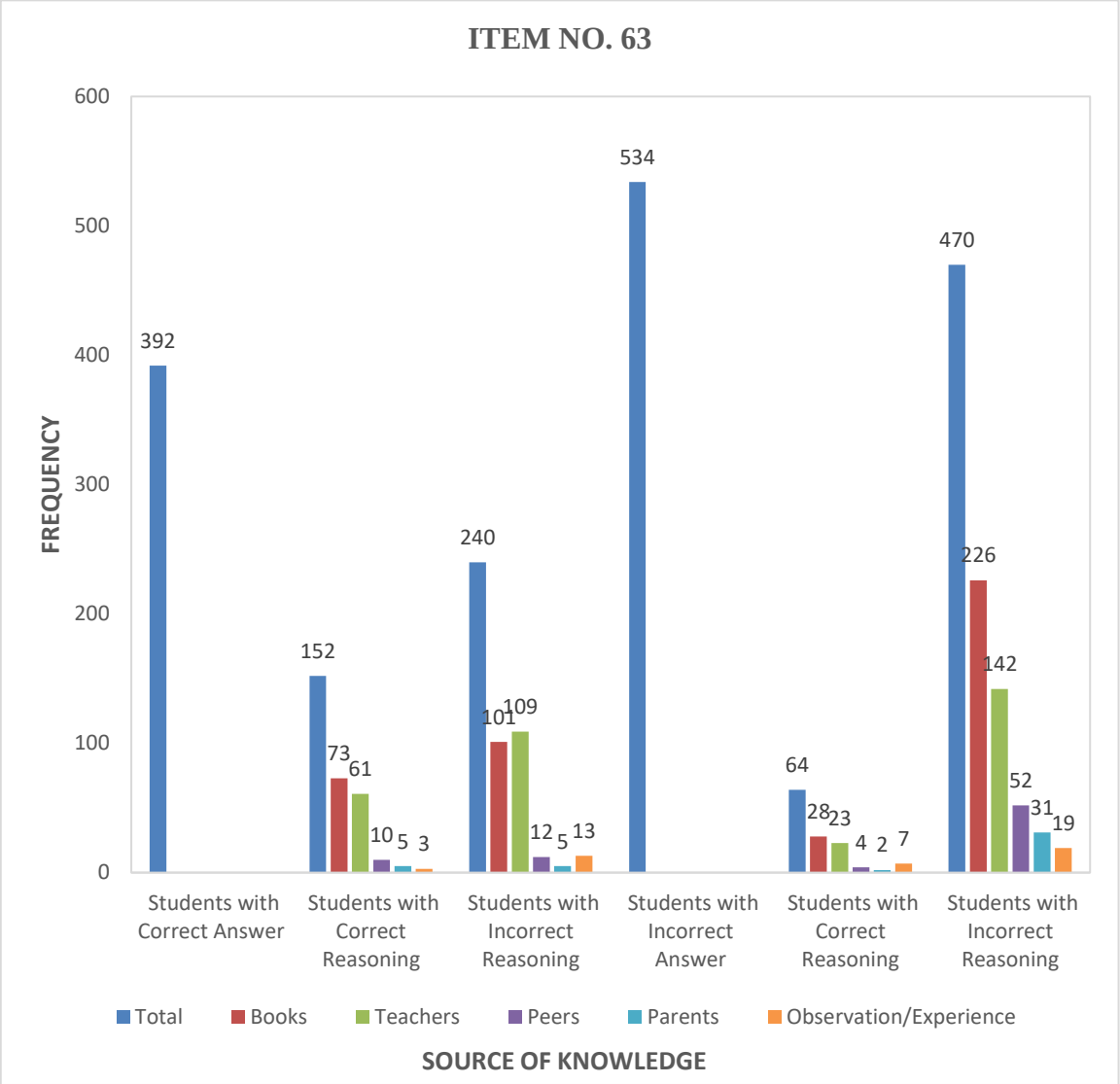
Out of 926 students 568 (61.33%) students considered books as their primary source of knowledge followed by teachers 284 (30.66%), peers 36 (3.88%), parents 25 (2.69%) and observations/experiences 13 (1.40%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 59 (6.38%) students had complete understanding of concept, 312 (33.69%) students had partial understanding of concept and 555 (59.93%) students had complete misunderstanding of concept or misconception.

Table_4.67 Student's Reasons and Source of Knowledge (Biology)

Item No. 63	A cell can survive when its nucleus is removed.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	392(42.33)	152(38.77)	240(61.23)	534(57.67)	64(11.98)	470(88.01)
Source of Knowledge						
Books		73(48.03)	101(42.08)		28(43.75)	226(48.09)
Teachers		61(40.13)	109(45.42)		23(35.95)	142(30.21)
Peers		10(6.58)	12(5.00)		4(6.25)	52(11.06)
Parents		5(3.29)	5(2.08)		2(3.13)	31(6.60)
Observation /Experience		3(1.97)	13(5.42)		7(10.94)	19(4.04)

Graph_4.67 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.67 it is evident that regarding item No. 63 out of 926 students 392 (42.33%) students had given correct answers. Out of 392 (42.33%) students who had given correct answers 152 (38.77%) students had given correct reasoning while 240 (61.23%) students had given incorrect reasoning. Out of 152 (38.77%) students who had given correct reasoning 73 (48.03%) students considered books as their primary source of knowledge followed by teachers-61 (40.13%), peers-10 (6.58%), parents-5 (3.29%) and observation/experience-3 (1.97%). Out of 240 (61.23 %) students who had given incorrect reasoning 101 (42.08%) students considered books as their primary source of knowledge followed by teachers-109 (45.42%), peers-12 (5%), parents-5 (2.08%) and observation/experience-13 (5.42%).

While out of 926 students 534 (57.67%) students had given incorrect answers. Out of 534 (57.67%) students who had given incorrect answers 64 (11.98%) students had given correct reasoning while 470 (88.01%) students had given incorrect reasoning. Out of 64 (11.98 %) students who had given correct reasoning, 28 (43.75%) students considered books as their primary source of knowledge followed by teachers-23 (35.95 %), peers-4 (6.25%), parents-2 (3.13%) and observation/experience-7 (10.94%). Out of 470 (88.01 %) students who had given incorrect reasoning, 226 (48.09%) students considered books as their primary source of knowledge followed by teachers-142 (30.21%), peers-52 (11.06%), parents-31 (6.60%) and observation/experience-19 (4.04%).

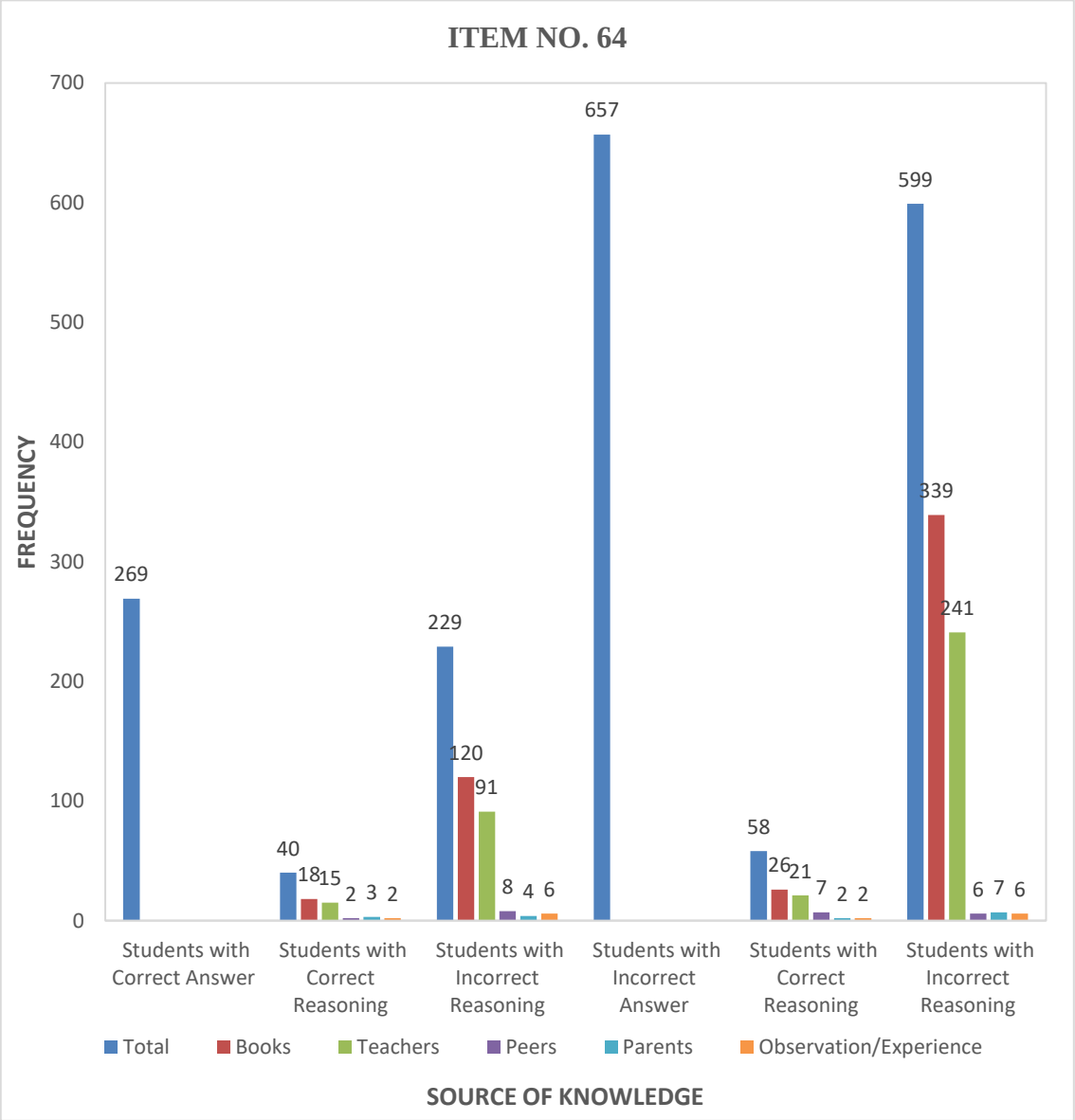
Out of 926 students 428 (46.22%) students considered books as their primary source of knowledge followed by teachers 335 (36.17%), peers 78 (8.42%), parents 43 (4.64%) and observations/experiences 42 (4.64%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 152 (16.41%) students had complete understanding of concept, 304 (32.83%) students had partial understanding of concept and 470 (50.76%) students had complete misunderstanding of concept or misconception.

Table_4.68 Student's Reasons and Source of Knowledge (Biology)

Item No. 64	Amoeba is a multicellular organism.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	269(29.05)	40(14.86)	229(85.14)	657(70.95)	58(8.82)	599(91.18)
Source of Knowledge						
Books		18(45.00)	120(52.40)		26(44.83)	339(56.59)
Teachers		15(37.50)	91(39.74)		21(36.21)	241(40.23)
Peers		2(5.00)	8(3.49)		7(12.07)	6(1.00)
Parents		3(7.50)	4(1.75)		2(3.45)	7(1.17)
Observation /Experience		2(5.00)	6(2.62)		2(3.45)	6(1.00)

Graph_4.68 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.68 it is evident that regarding item No. 64 out of 926 students 269 (29.05%) students had given correct answers. Out of 269 (29.05%) students who had given correct answers 40 (14.86%) students had given correct reasoning while 229 (85.14%) students had given incorrect reasoning. Out of 40 (14.86%) students who had given correct reasoning 18 (45%) students considered books as their primary source of knowledge followed by teachers-15 (37.50%), peers-2 (5%), parents-3 (7.50%) and observation/experience-2 (5%). Out of 229 (85.14%) students who had given incorrect reasoning 120 (52.40%) students considered books as their primary source of knowledge followed by teachers-91 (39.74%), peers-8 (3.49%), parents-4 (1.75%) and observation/experience-6 (2.62%).

While out of 926 students 657 (70.95%) students had given incorrect answers. Out of 657 (70.95%) students who had given incorrect answers 58 (8.82%) students had given correct reasoning while 599 (91.18%) students had given incorrect reasoning. Out of 58 (8.82%) students who had given correct reasoning, 26 (44.83%) students considered books as their primary source of knowledge followed by teachers-21 (36.21%), peers-7 (12.07%), parents-2 (3.45%) and observation/experience-2 (3.45%). Out of 599 (91.18 %) students who had given incorrect reasoning, 339 (56.59%) students considered books as their primary source of knowledge followed by teachers-241 (40.23%), peers-6 (1%), parents-7 (1.17%) and observation/experience-6 (1%).

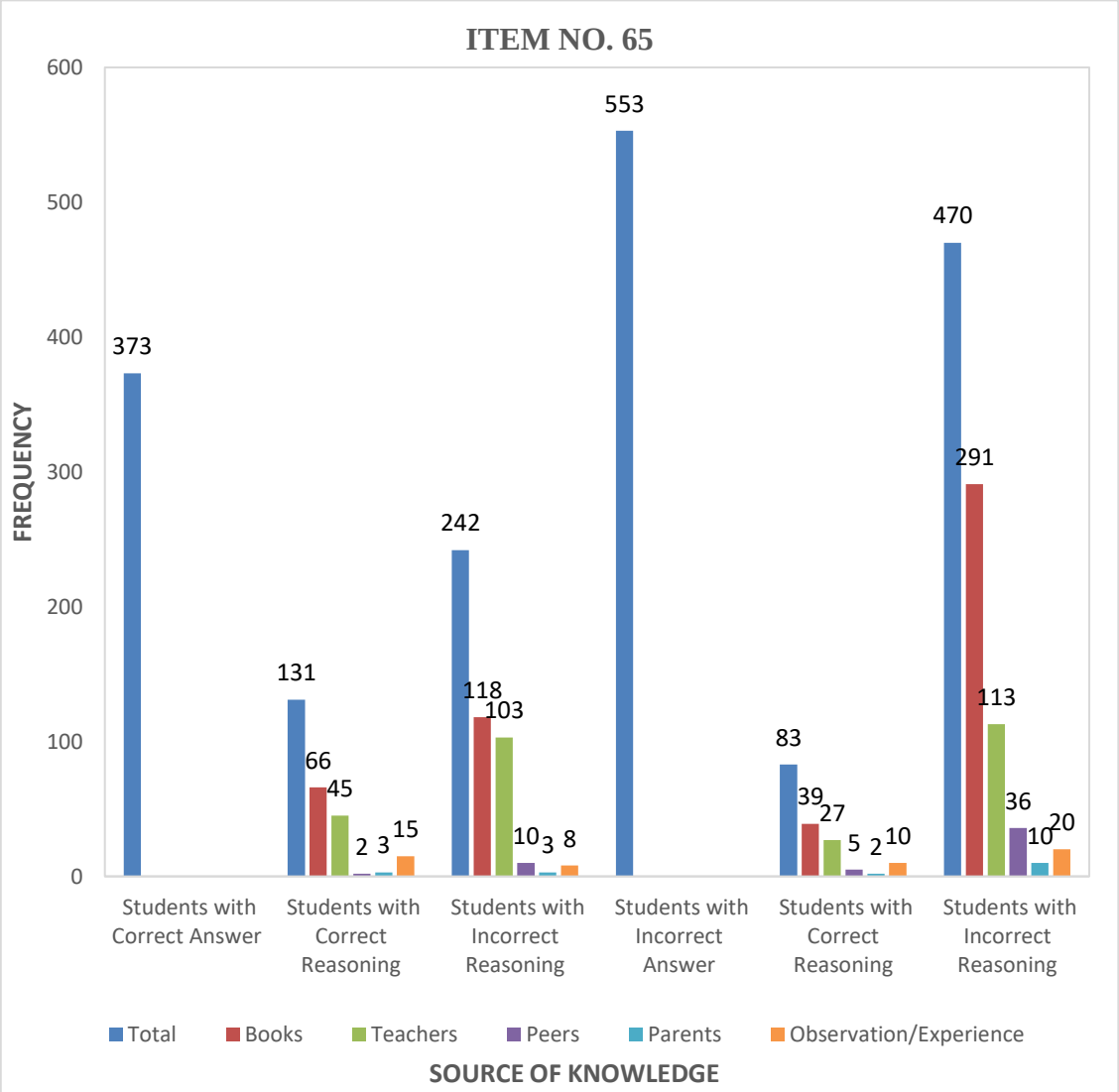
Out of 926 students 503 (54.31%) students considered books as their primary source of knowledge followed by teachers 368 (39.74%), peers 23 (2.48%), parents 16 (1.72%) and observations/experiences 16 (1.72%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 40 (4.31%) students had complete understanding of concept, 287 (31%) students had partial understanding of concept and 599 (64.69%) students had complete misunderstanding of concept or misconception.

Table_4.69 Student's Reasons and Source of Knowledge (Biology)

Item No. 65	Chloroplast is the characteristic feature of the plant cell.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	373(40.28)	131(35.12)	242(64.88)	553(59.72)	83(15.00)	470(85.00)
Source of Knowledge						
Books		66(50.38)	118(48.76)		39(46.99)	291(61.91)
Teachers		45(34.35)	103(42.56)		27(32.53)	113(24.04)
Peers		2(1.53)	10(4.13)		5(6.02)	36(7.66)
Parents		3(2.29)	3(1.24)		2(2.41)	10(2.13)
Observation /Experience		15(11.45)	8(3.31)		10(12.05)	20(4.26)

Graph_4.69 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.69 it is evident that regarding item No. 65 out of 926 students 373 (40.28%) students had given correct answers. Out of 373 (40.28%) students who had given correct answers 131 (35.12%) students had given correct reasoning while 242 (64.88%) students had given incorrect reasoning. Out of 131 (35.12%) students who had given correct reasoning 66 (50.38%) students considered books as their primary source of knowledge followed by teachers-45 (34.35%), peers-2 (1.53%), parents-3 (2.29%) and observation/experience-15 (11.45%). Out of 242 (64.88%) students who had given incorrect reasoning 118 (48.76%) students considered books as their primary source of knowledge followed by teachers-103 (42.56%), peers-10 (4.13%), parents-3 (1.24%) and observation/experience-8 (3.31%).

While out of 926 students 553 (59.72%) students had given incorrect answers. Out of 553 (59.72%) students who had given incorrect answers 83 (15%) students had given correct reasoning while 470 (85%) students had given incorrect reasoning. Out of 83 (15%) students who had given correct reasoning, 39 (46.99%) students considered books as their primary source of knowledge followed by teachers-27 (32.53%), peers-5 (6.02%), parents-2 (2.41%) and observation/experience-10 (12.05%). Out of 470 (85%) students who had given incorrect reasoning, 291 (61.91%) students considered books as their primary source of knowledge followed by teachers-113 (24.04%), peers-36 (7.66 %), parents-10 (2.13%) and observation/experience-20 (4.26%).

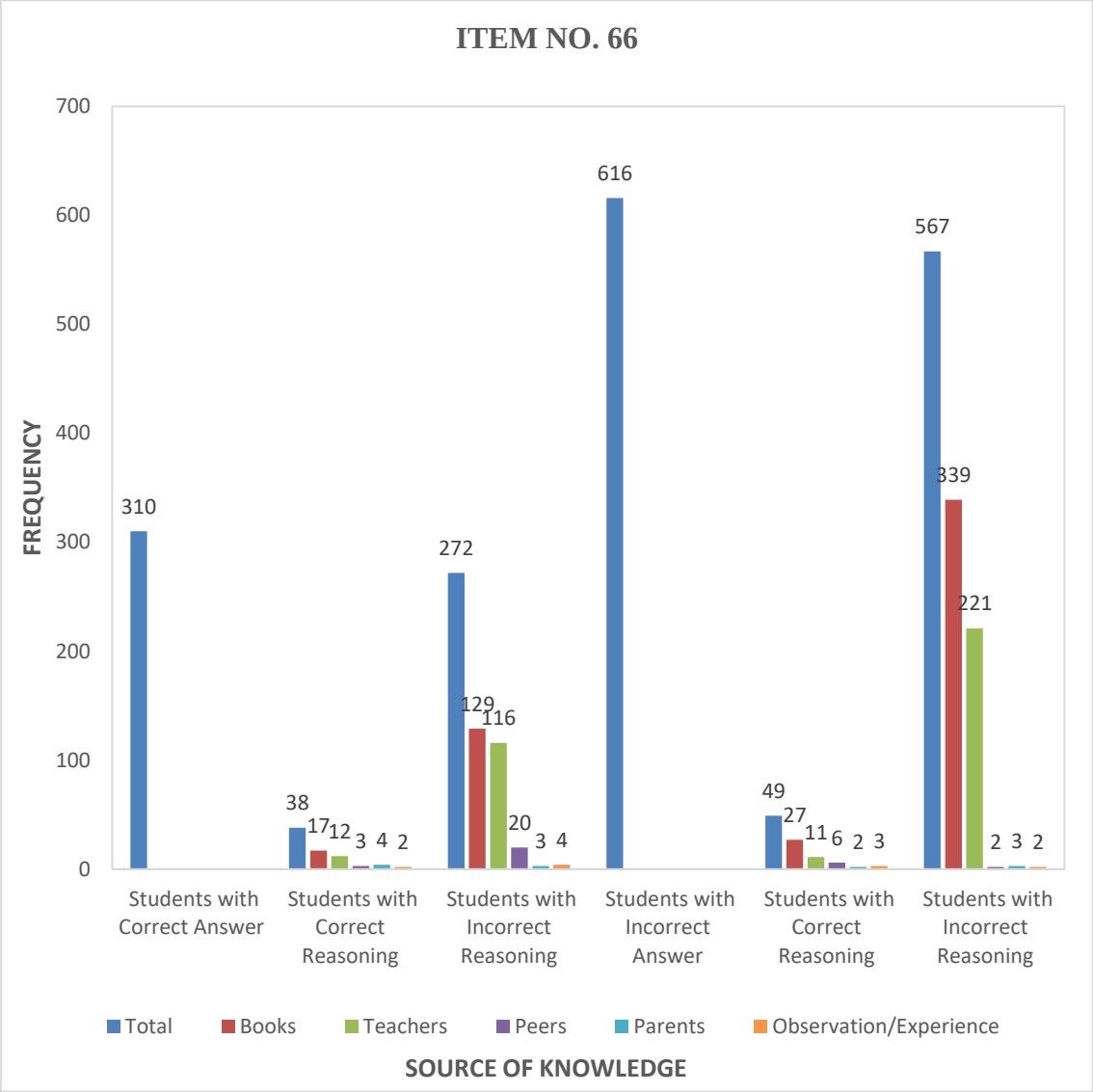
Out of 926 students 514 (55.50%) students considered books as their primary source of knowledge followed by teachers 288 (31.10%), peers 53 (5.72%), parents 18 (1.94%) and observations/experiences 53 (5.72%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 131 (14.14%) students had complete understanding of concept, 325 (35.09%) students had partial understanding of concept and 470 (50.77%) students had complete misunderstanding of concept or misconception.

Table_4.70 Student's Reasons and Source of Knowledge (Biology)

Item No. 66	Amoeba can change its shape.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	310(33.48)	38(12.25)	272(87.75)	616(66.52)	49(7.95)	567(92.05)
Source of Knowledge						
Books		17(44.74)	129(47.43)		27(55.10)	339(59.79)
Teachers		12(31.58)	116(2.65)		11(22.45)	221(38.98)
Peers		3(7.89)	20(7.35)		6(12.24)	2(0.35)
Parents		4(10.53)	3(1.10)		2(4.08)	3(0.53)
Observation /Experience		2(5.26)	4(1.47)		3(6.12)	2(0.35)

Graph_4.70 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.70 it is evident that regarding item No. 66 out of 926 students 310 (33.48%) students had given correct answers. Out of 310 (33.48%) students who had given correct answers 38 (12.25%) students had given correct reasoning while 272 (87.75%) students had given incorrect reasoning. Out of 38 (12.25%) students who had given correct reasoning 17 (44.74%) students considered books as their primary source of knowledge followed by teachers-12 (31.58%), peers-3 (7.89%), parents-4 (10.53%) and observation/experience-2 (5.26%). Out of 272 (87.75%) students who had given incorrect reasoning 129 (47.43%) students considered books as their primary source of knowledge followed by teachers-116 (2.65%), peers-20 (7.35%), parents-3 (1.10%) and observation/experience-4 (1.47%).

While out of 926 students 616 (66.52%) students had given incorrect answers. Out of 616 (66.52%) students who had given incorrect answers 49 (7.95%) students had given correct reasoning while 567 (92.05%) students had given incorrect reasoning. Out of 49 (7.95%) students who had given correct reasoning, 27 (55.10%) students considered books as their primary source of knowledge followed by teachers-11 (22.45 %), peers-6 (12.24%), parents-2 (4.08%) and observation/experience-3 (6.12%). Out of 567 (92.05 %) students who had given incorrect reasoning, 339 (59.79%) students considered books as their primary source of knowledge followed by teachers-221 (38.98%), peers-2 (0.35%), parents-3 (0.5%) and observation/experience-2 (0.35%).

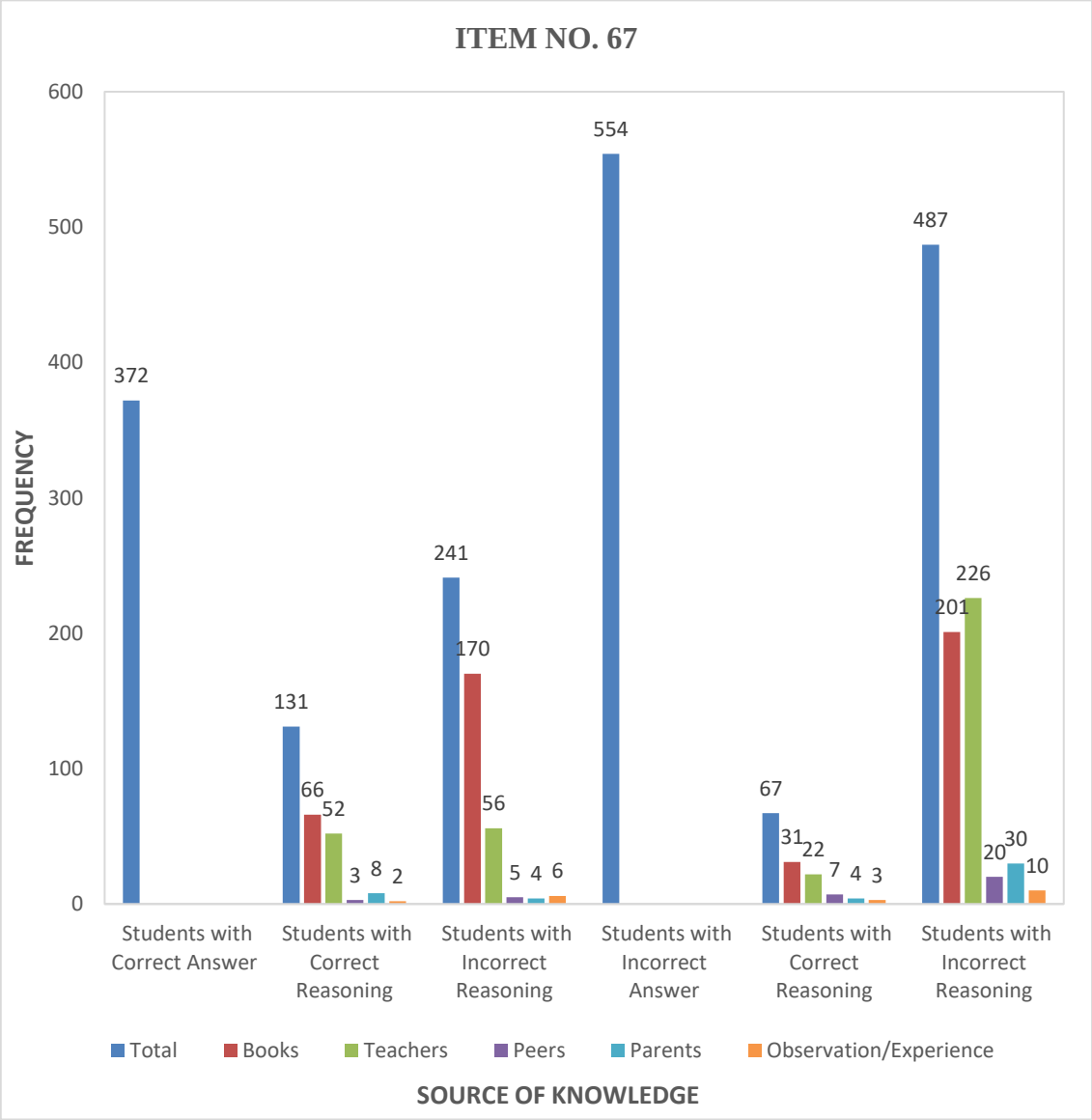
Out of 926 students 512 (55.29%) students considered books as their primary source of knowledge followed by teachers 360 (38.87%), peers 31 (3.34%), parents 12 (1.29%) and observations/experiences 11 (1.18%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 38 (4.11%) students had complete understanding of concept, 321 (34.66%) students had partial understanding of concept and 567 (92.05%) students had complete misunderstanding of concept or misconception.

Table_4.71 Student's Reasons and Source of Knowledge (Biology)

Item No. 67	Red Blood Cells (RBC) are branched.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	372(40.17)	131(35.21)	241(64.79)	554(59.83)	67(12.09)	487(87.91)
Source of Knowledge						
Books		66(50.38)	170(70.54)		31(46.27)	201(41.27)
Teachers		52(39.69)	56(23.24)		22(32.84)	226(46.41)
Peers		3(2.29)	5(2.07)		7(10.45)	20(4.11)
Parents		8(6.11)	4(1.66)		4(5.97)	30(6.16)
Observation /Experience		2(1.53)	6(2.49)		3(4.48)	10(2.05)

Graph_4.71 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.71 it is evident that regarding item No. 67 out of 926 students 372 (40.17%) students had given correct answers. Out of 372 (40.17%) students who had given correct answers 131 (35.21%) students had given correct reasoning while 241 students had given incorrect reasoning. Out of 131 (35.21%) students who had given correct reasoning 66 (50.38%) students considered books as their primary source of knowledge followed by teachers-52 (39.69%), peers-3 (2.29%), parents-8 (6.11%) and observation/experience-2 (1.53%). Out of 241 (64.79%) students who had given incorrect reasoning 170 (70.54%) students considered books as their primary source of knowledge followed by teachers-56 (23.24%), peers-5 (2.07%), parents-4 (1.66%) and observation/experience-6 (2.49%).

While out of 926 students 554 (59.83%) students had given incorrect answers. Out of 554 (59.83%) students who had given incorrect answers 67 (12.09%) students had given correct reasoning while 487 (87.91%) students had given incorrect reasoning. Out of 67 (12.09%) students who had given correct reasoning, 31 (46.27%) students considered books as their primary source of knowledge followed by teachers-22 (32.84%), peers-7 (10.45%), parents-4 (5.97%) and observation/experience-3 (4.48%). Out of 487 (87.91 %) students who had given incorrect reasoning, 201 (41.27%) students considered books as their primary source of knowledge followed by teachers-226 (46.41%), peers-20 (4.11%), parents-30 (6.16%) and observation/experience-10 (2.05%).

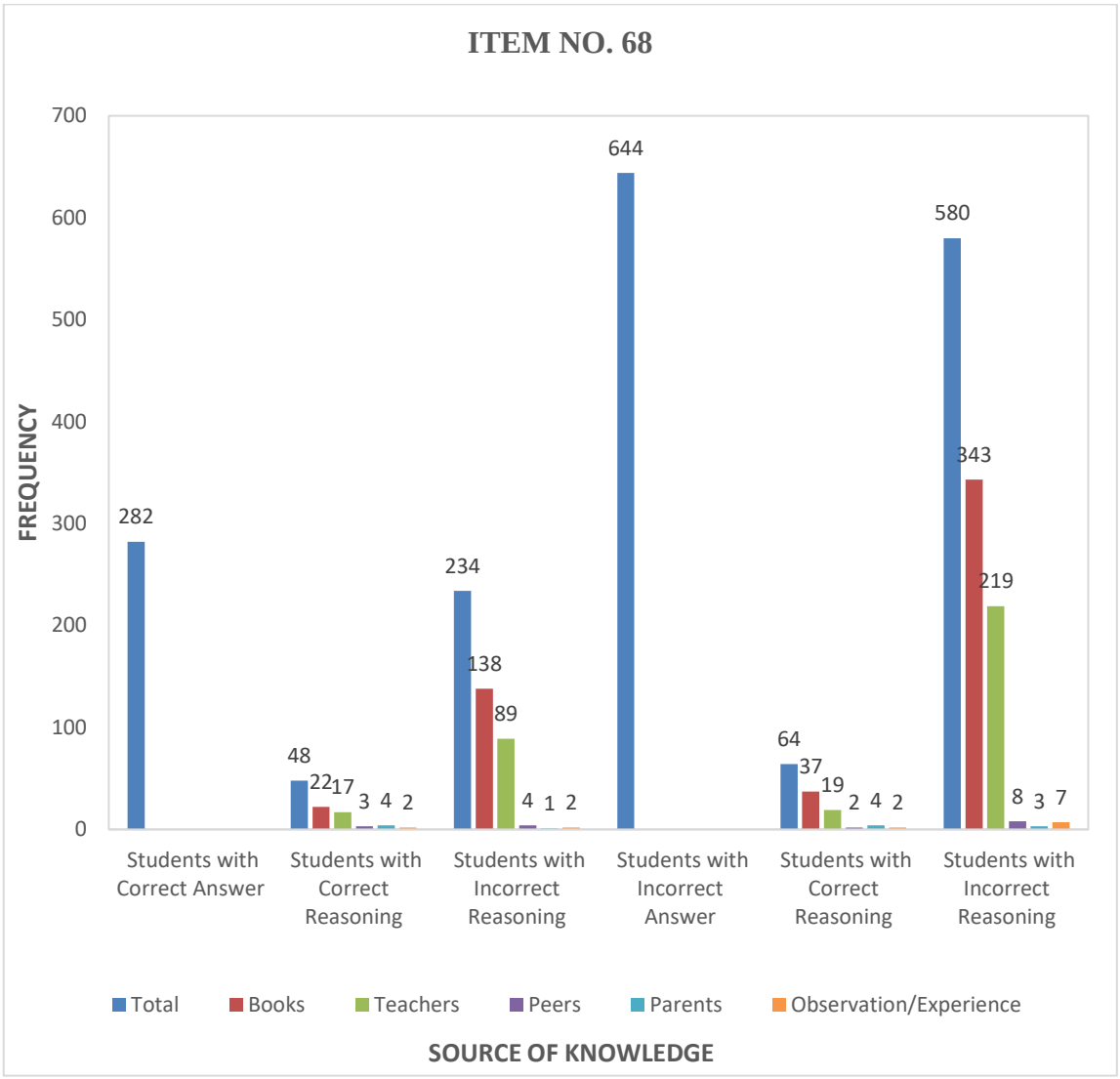
Out of 926 students 468 (50.53%) students considered books as their primary source of knowledge followed by teachers 365 (39.41%), peers 35 (3.77%), parents 46 (4.96%) and observations/experiences 21 (2.26%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 131 (14.14%) students had complete understanding of concept, 308 (33.26%) students had partial understanding of concept and 487 (52.60%) students had complete misunderstanding of concept or misconception.

Table_4.72 Student's Reasons and Source of Knowledge (Biology)

Item No. 68	A cell can contain more than one nucleus.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	282(30.45)	48(17.02)	234(82.98)	644(69.55)	64(9.93)	580(90.07)
Source of Knowledge						
Books		22(45.83)	138(58.97)		37(57.81)	343(58.42)
Teachers		17(35.42)	89(38.03)		19(29.69)	219(38.42)
Peers		3(6.25)	4(1.71)		2(3.13)	8(1.40)
Parents		4(8.33)	1(0.43)		4(6.25)	3(0.53)
Observation /Experience		2(4.17)	2(0.85)		2(3.13)	7(1.23)

Graph_4.72 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.72 it is evident that regarding item No. 68 out of 926 students 282 (30.45%) students had given correct answers. Out of 282 (30.45%) students who had given correct answers 48 (17.02%) students had given correct reasoning while 234 (82.98%) students had given incorrect reasoning. Out of 48 (17.02%) students who had given correct reasoning 22 (45.83%) students considered books as their primary source of knowledge followed by teachers-17 (35.42%), peers-3 (6.25%), parents-4 (8.33%) and observation/experience-2 (4.17%). Out of 234 (82.98%) students who had given incorrect reasoning 138 (58.97%) students considered books as their primary source of knowledge followed by teachers-89 (38.03%), peers-4 (1.71%), parents-1 (0.43%) and observation/experience-2 (0.85%).

While out of 926 students 644 (69.55%) students had given incorrect answers. Out of 644 (69.55%) students who had given incorrect answers 64 (9.93%) students had given correct reasoning while 580 (90.07%) students had given incorrect reasoning. Out of 64 (9.93 %) students who had given correct reasoning, 37 (57.81%) students considered books as their primary source of knowledge followed by teachers-19 (26.69%), peers-2 (3.13%), parents-4 (6.25%) and observation/experience-2 (3.13%). Out of 580 (90.07 %) students who had given incorrect reasoning, 343 (58.42%) students considered books as their primary source of knowledge followed by teachers-219 (38.42%), peers-8 (1.40%), parents-3 (0.53%) and observation/experience-7 (1.23%).

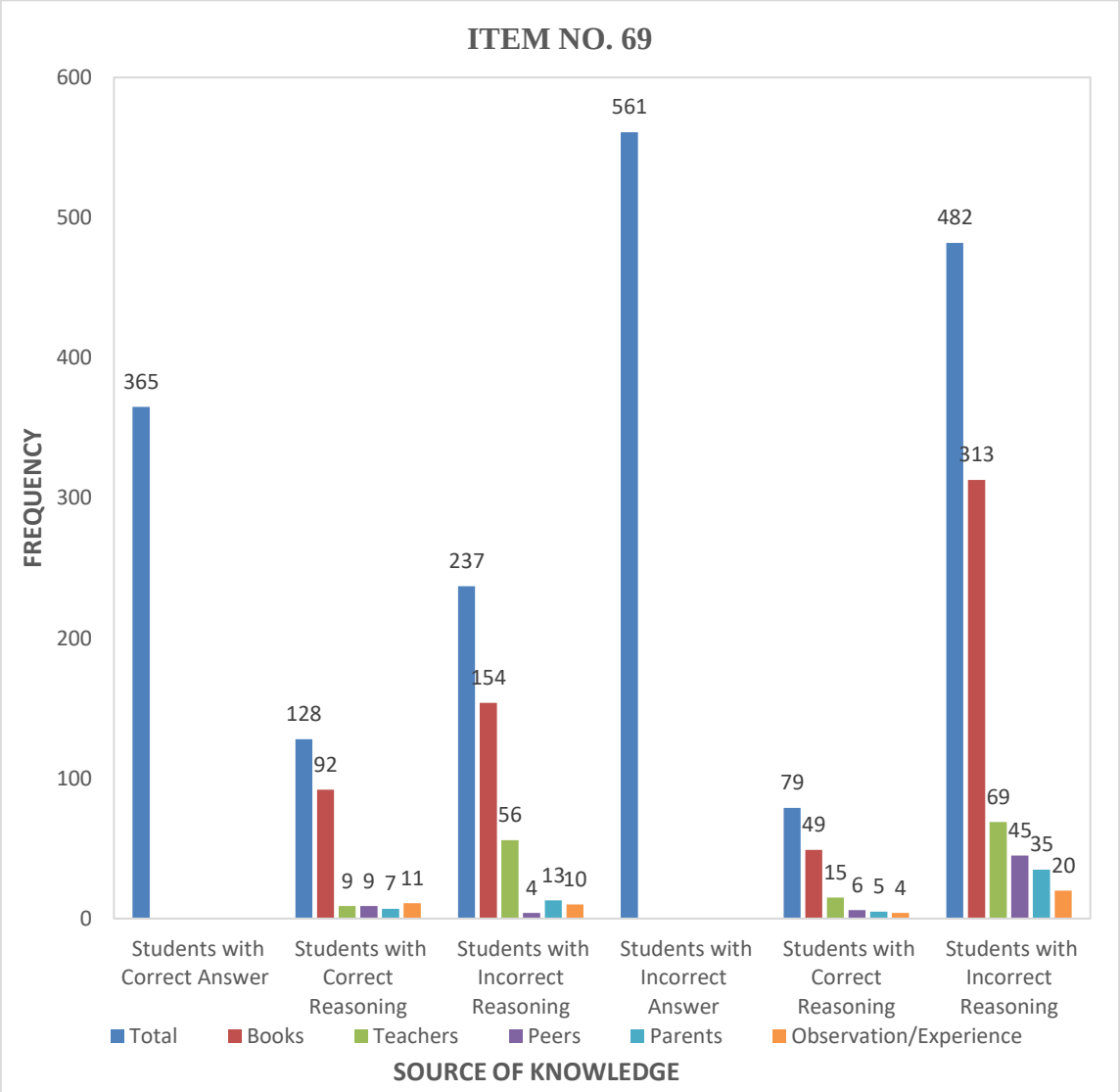
Out of 926 students 540 (58.31%) students considered books as their primary source of knowledge followed by teachers 344 (37.14%), peers 17 (1.83%), parents 12 (1.29%) and observations/experiences 13 (1.40 %). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 48 (5.18%) students had complete understanding of concept, 298 (32.18%) students had partial understanding of concept and 580 (62.64%) students had complete misunderstanding of concept or misconception.

Table_4.73 Student's Reasons and Source of Knowledge (Biology)

Item No. 69	Vacuole in animal cell is larger than plant cell.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	365(39.42)	128(35.06)	237(64.94)	561(60.58)	79(14.08)	482(85.92)
Source of Knowledge						
Books		92(71.88)	154(64.98)		49(62.03)	313(64.94)
Teachers		9(7.03)	56(23.63)		15(18.99)	69(14.32)
Peers		9(7.03)	4(1.69)		6(7.59)	45(9.34)
Parents		7(5.47)	13(5.49)		5(6.33)	35(7.26)
Observation /Experience		11(8.59)	10(4.22)		4(5.06)	20(4.15)

Graph_4.73 Students Reasons and Source of Knowledge (Biology)



From table 4.73 it is evident that regarding item No. 69 out of 926 students 365 (39.42 %) students had given correct answers. Out of 365 (39.42%) students who had given correct answers 128 (35.06%) students had given correct reasoning while 237 (64.94%) students had given incorrect reasoning. Out of 128 (35.06%) students who had given correct reasoning 92 (71.88%) students considered books as their primary source of knowledge followed by teachers-9 (7.03%), peers-9 (7.03%), parents-7 (5.47%) and observation/experience-11 (8.59%). Out of 237 (64.94%) students who had given incorrect reasoning 154 (64.98%) students considered books as their primary source of knowledge followed by teachers-56 (23.63%), peers-4 (1.69%), parents-13 (5.49%) and observation/experience-10 (4.22%).

While out of 926 students 561 (60.58%) students had given incorrect answers. Out of 561 (60.58%) students who had given incorrect answers 79 (14.08%) students had given correct reasoning while 482 (85.92%) students had given incorrect reasoning. Out of 79 (14.08%) students who had given correct reasoning, 49 (62.03%) students considered books as their primary source of knowledge followed by teachers-15 (18.99%), peers-6 (7.59%), parents-5 (6.33%) and observation/experience-4 (5.06%). Out of 482 (85.92 %) students who had given incorrect reasoning, 313 (64.94%) students considered books as their primary source of knowledge followed by teachers-69 (14.32%), peers-45 (9.34%), parents-35 (7.26%) and observation/experience-20 (4.15%).

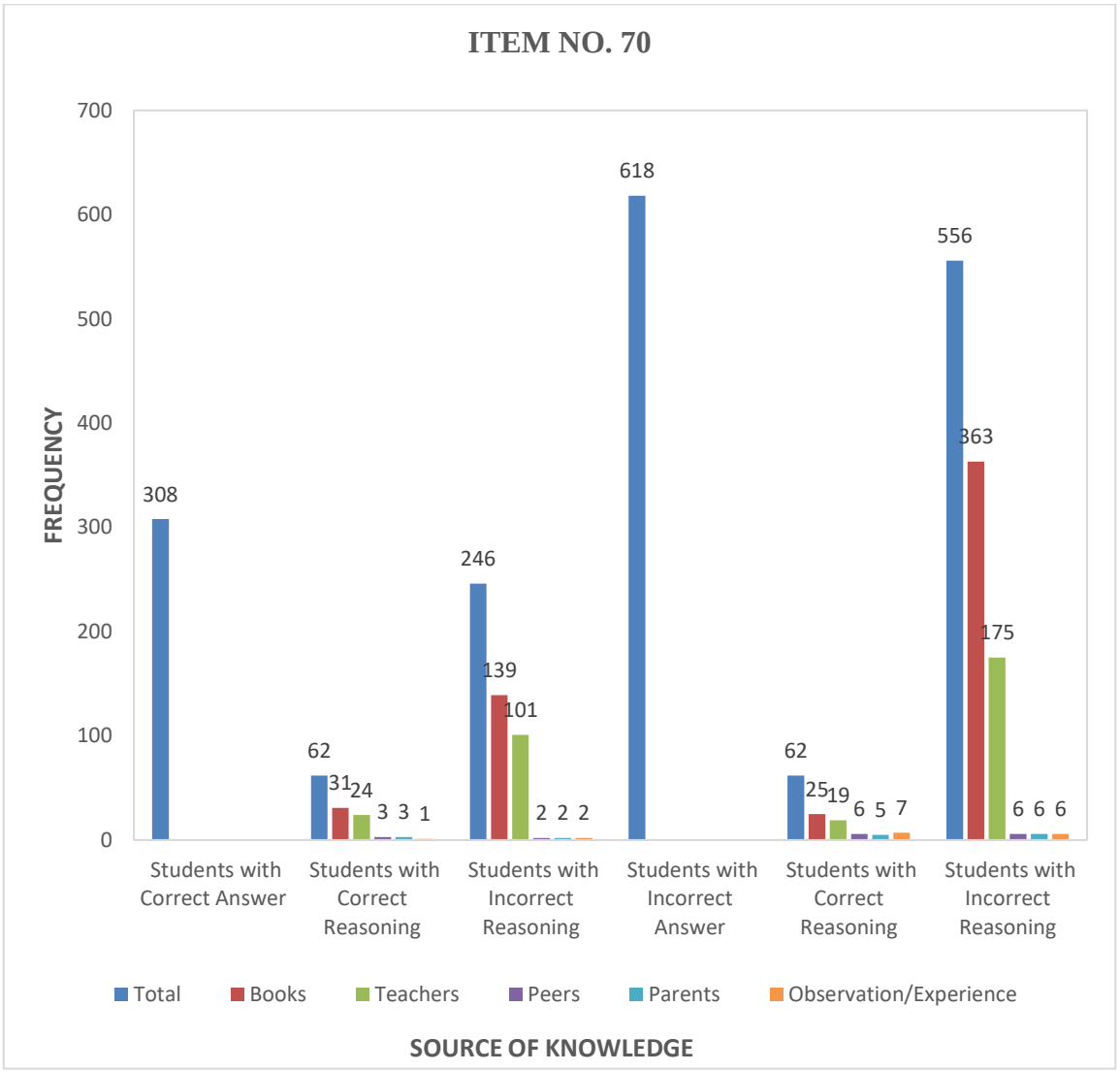
Out of 926 students 608 (65.65%) students considered books as their primary source of knowledge followed by teachers 149 (16.09%), peers 64 (6.91%), parents 60 (6.47%) and observations/experiences 45 (4.85%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 128 (13.82%) students had complete understanding of concept, 316 (34.13%) students had partial understanding of concept and 482 (52.05%) students had complete misunderstanding of concept or misconception.

Table_4.74 Student's Reasons and Source of Knowledge (Biology)

Item No. 70	E. Coli is a prokaryotic organism.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	308(33.26)	62(20.12)	246(79.88)	618(66.74)	62(10.03)	556(89.97)
Source of Knowledge						
Books		31(50.00)	139(56.50)		25(40.32)	363(65.29)
Teachers		24(38.71)	101(41.60)		19(30.65)	175(31.47)
Peers		3(4.84)	2(0.81)		6(9.68)	6(1.08)
Parents		3(4.84)	2(0.81)		5(8.06)	6(1.08)
Observation /Experience		1(1.61)	2(0.81)		7(11.29)	6(1.08)

Graph_4.74 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.74 it is evident that regarding item No.70 out of 926 students 308 (33.26 %) students had given correct answers. Out of 308 (33.26%) students who had given correct answers 62 (20.12%) students had given correct reasoning while 246 (79.88%) students had given incorrect reasoning. Out of 62 (20.12%) students who had given correct reasoning 31(50%) students considered books as their primary source of knowledge followed by teachers-24 (38.71%), peers-3 (4.84%), parents-3 (4.84%) and observation/experience-1 (1.61%). Out of 246 (79.88%) students who had given incorrect reasoning 139 (56.50%) students considered books as their primary source of knowledge followed by teachers-101 (41.60%), peers-2 (0.81%), parents-2 (0.81%) and observation/experience-2 (0.81%).

While out of 926 students 618 (66.74%) students had given incorrect answers. Out of 618 (66.74%) students who had given incorrect answers 62 (10.03%) students had given correct reasoning while 556 students had given incorrect reasoning. Out of 62 (10.03%) students who had given correct reasoning, 25 (40.32%) students considered books as their primary source of knowledge followed by teachers-19 (30.65%), peers-6 (9.68%), parents-5 (8.06%) and observation/experience-7 (11.29%). Out of 556 (89.97%) students who had given incorrect reasoning, 363 (65.29%) students considered books as their primary source of knowledge followed by teachers-175 (31.47%), peers-6 (1.08 %), parents-6 (1.08%) and observation/experience-6 (1.08%).

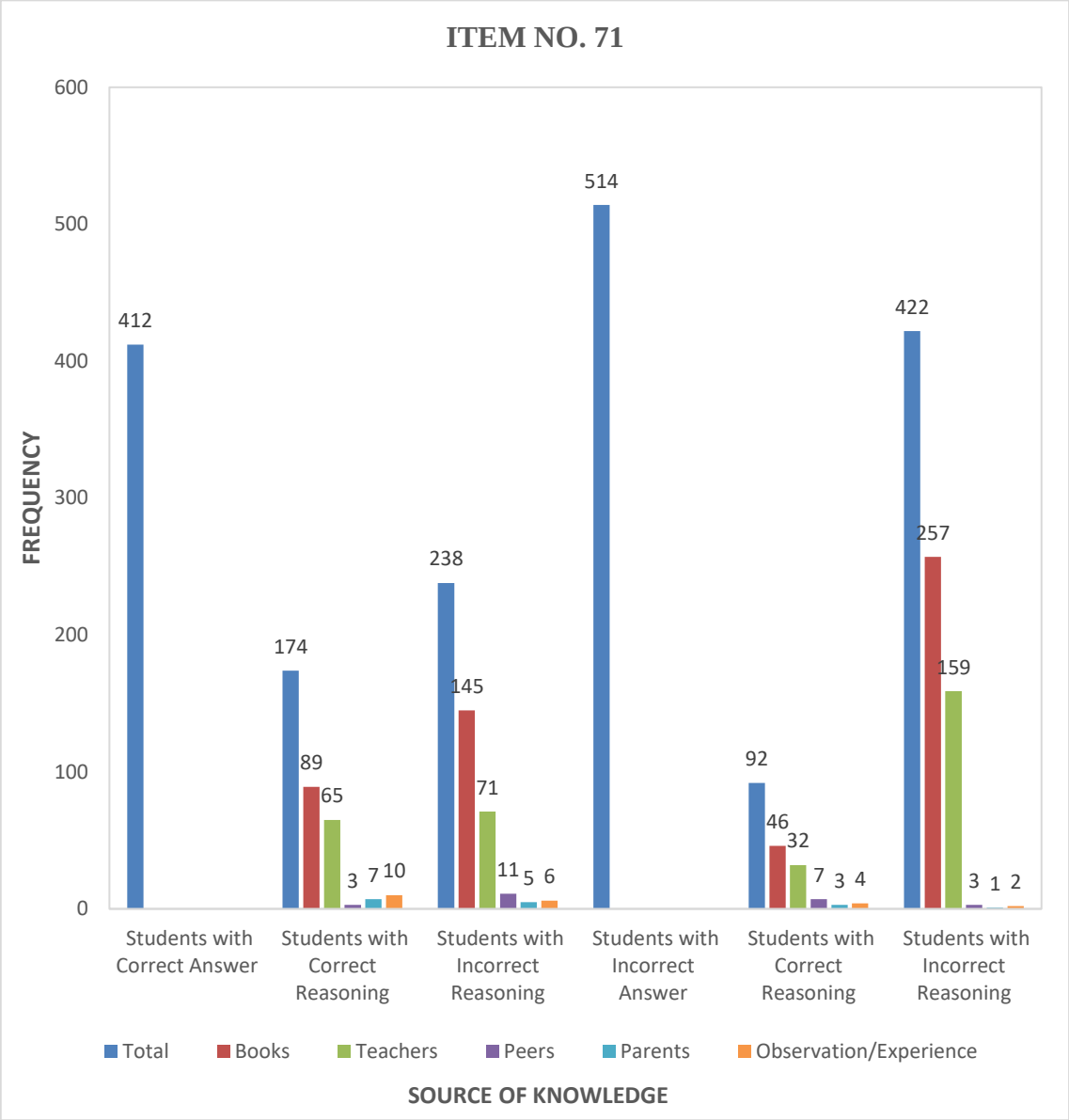
Out of 926 students 558 (60.25 %) students considered books as their primary source of knowledge followed by teachers 319 (34.44 %), peers 17 (1.83 %), parents 16 (1.72 %) and observations/experiences 16 (1.72 %). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 62 (6.69 %) students had complete understanding of concept, 308 (33.26 %) students had partial understanding of concept and 556 (60.05 %) students had complete misunderstanding of concept or misconception.

Table_4.75 Student's Reasons and Source of Knowledge (Biology)

Item No. 71	Cell wall is present only in plant cells.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	412(44.49)	174(42.23)	238(57.77)	514(55.51)	92(17.89)	422(82.11)
Source of Knowledge						
Books		89(51.15)	145(60.92)		46(50.00)	257(60.90)
Teachers		65(37.36)	71(29.83)		32(34.78)	159(37.68)
Peers		3(1.72)	11(4.62)		7(7.61)	3(0.71)
Parents		7(4.02)	5(2.10)		3(3.26)	1(0.24)
Observation /Experience		10(5.75)	6(2.52)		4(4.35)	2(0.47)

Graph_4.75 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.75 it is evident that regarding item No.71 out of 926 students 412 (44.49%) students had given correct answers. Out of 412 (44.49%) students who had given correct answers 174 (42.23%) students had given correct reasoning while 238 (57.77%) students had given incorrect reasoning. Out of 174 (42.23%) students who had given correct reasoning 89 (51.15%) students considered books as their primary source of knowledge followed by teachers-65 (37.36%), peers-3 (1.72%), parents-7 (4.02%) and observation/experience-10 (5.75%). Out of 238 (57.77%) students who had given incorrect reasoning 145 (60.92%) students considered books as their primary source of knowledge followed by teachers-71 (29.83%), peers-11 (4.62%), parents-5 (2.10%) and observation/experience-6 (2.52%).

While out of 926 students 514 (55.51%) students had given incorrect answers. Out of 514 students who had given incorrect answers 92 (17.89%) students had given correct reasoning while 422 students had given incorrect reasoning. Out of 92 (17.89%) students who had given correct reasoning, 46 (50%) students considered books as their primary source of knowledge followed by teachers-32 (34.78%), peers-7 (7.61%), parents-3 (3.26%) and observation/experience-4 (4.35%). Out of 422 (82.11%) students who had given incorrect reasoning, 257 (60.90%) students considered books as their primary source of knowledge followed by teachers-159 (37.68%), peers-3 (0.71%), parents-1 (0.24%) and observation/experience-2 (0.24%).

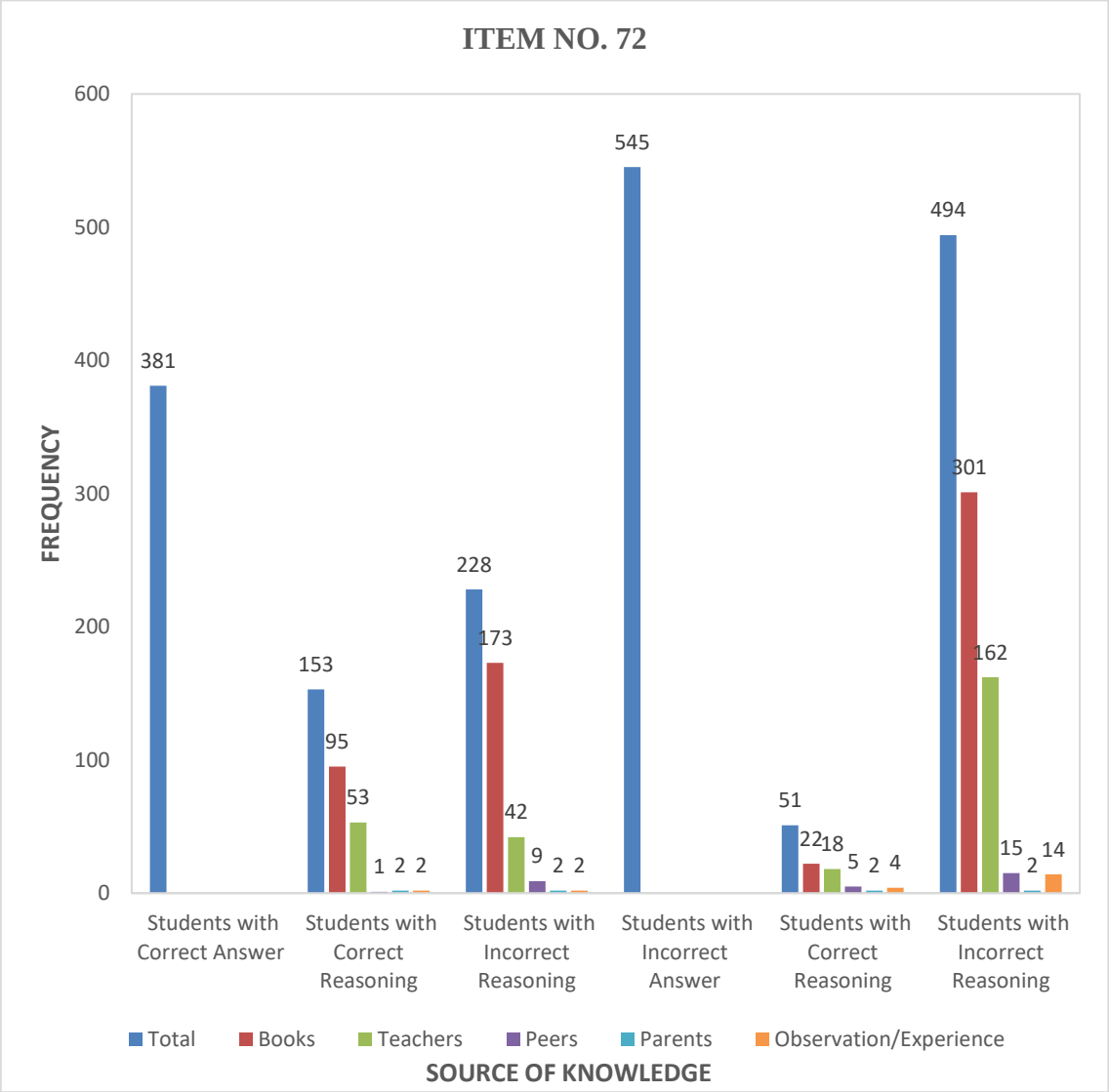
Out of 926 students 537 (57.99%) students considered books as their primary source of knowledge followed by teachers 327 (35.31%), peers 24 (2.59%), parents 16 (1.72%) and observations/experiences 22 (2.37%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 174 (18.79%) students had complete understanding of concept, 330 (35.64%) students had partial understanding of concept and 422 (45.57%) students had complete misunderstanding of concept or misconception.

Table_4.76 Student's Reasons and Source of Knowledge (Biology)

Item No. 72	Tissue is the group of similar cells.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	381(41.14)	153(40.15)	228(59.85)	545(58.86)	51(9.35)	494(90.65)
Source of Knowledge						
Books		95(62.09)	173(75.88)		22(43.14)	301(60.93)
Teachers		53(34.64)	42(18.42)		18(35.29)	162(32.79)
Peers		1(0.65)	9(3.95)		5(9.80)	15(3.04)
Parents		2(1.31)	2(0.88)		2(3.92)	2(0.40)
Observation /Experience		2(1.31)	2(0.88)		4(7.84)	14(2.83)

Graph_4.76 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.76 it is evident that regarding item No.72 out of 926 students 381(41.14 %) students had given correct answers. Out of 381 (41.14%) students who had given correct answers 153 students had given correct reasoning while 228 (59.85%) students had given incorrect reasoning. Out of 153 (40.15%) students who had given correct reasoning 95 (62.09%) students considered books as their primary source of knowledge followed by teachers-53 (34.64%), peers-1 (0.65%), parents-2 (1.31%) and observation/experience-2 (1.31%). Out of 238 (59.85%) students who had given incorrect reasoning 173 (75.88%) students considered books as their primary source of knowledge followed by teachers-42 (18.42%), peers-9 (3.95%), parents-2 (0.88%) and observation/experience-2 (0.88%).

While out of 926 students 545 (58.86%) students had given incorrect answers. Out of 545 (58.86%) students who had given incorrect answers 51 (9.35%) students had given correct reasoning while 494 (90.65%) students had given incorrect reasoning. Out of 51 (9.35%) students who had given correct reasoning, 22 (43.14%) students considered books as their primary source of knowledge followed by teachers-18 (35.29%), peers-5 (9.80%), parents-2 (3.92%) and observation/experience-4 (7.84%). Out of 494 (90.65 %) students who had given incorrect reasoning, 301 (60.93%) students considered books as their primary source of knowledge followed by teachers-162 (32.79%), peers-15 (3.04%), parents-2 (0.40%) and observation/experience-14 (2.83%).

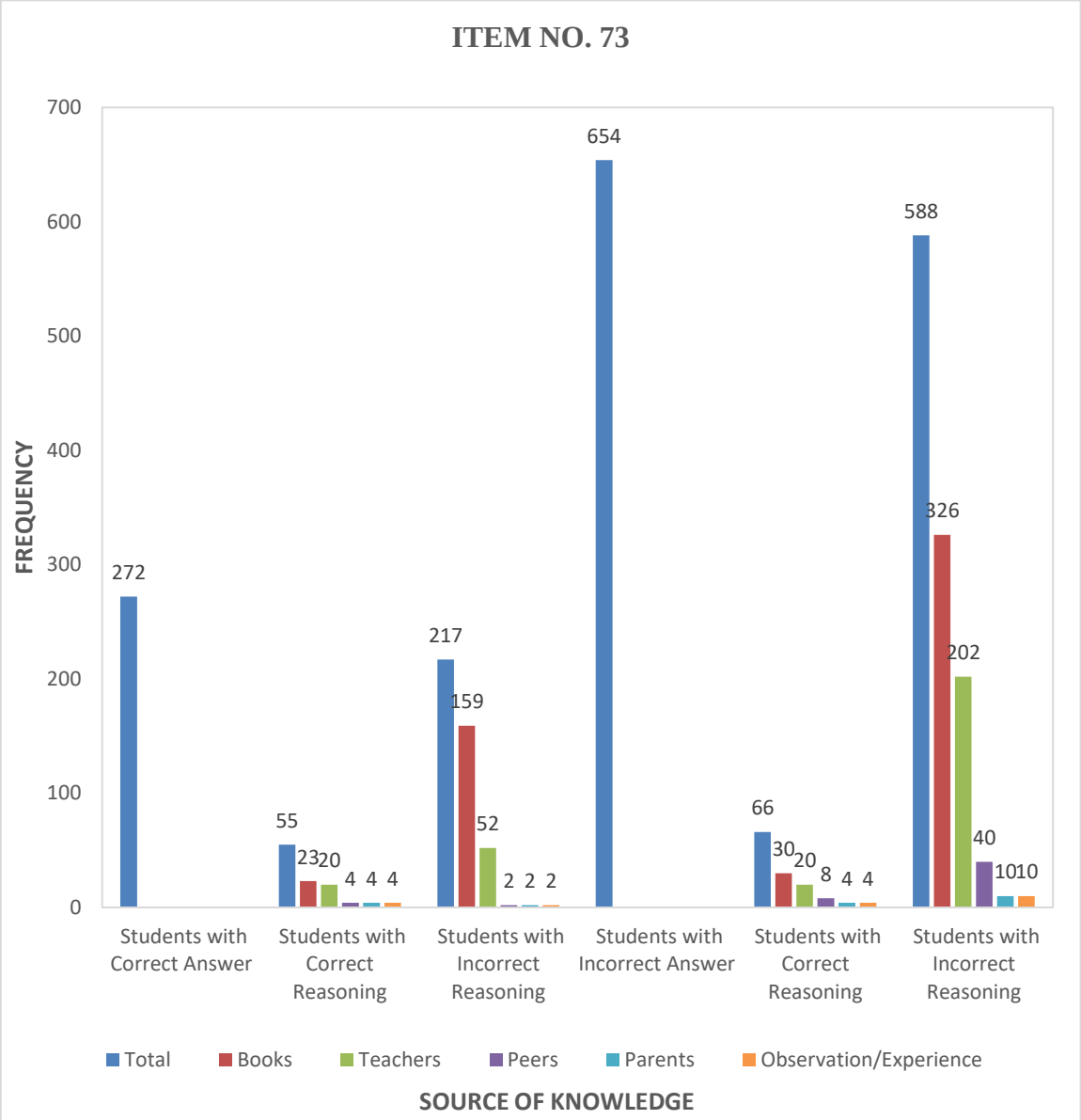
Out of 926 students 591 (63.82%) students considered books as their primary source of knowledge followed by teachers 275 (29.69%), peers 30 (3.23%), parents 8 (0.86%) and observations/experiences 22 (2.37%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 153 (16.53%) students had complete understanding of concept, 204 (22.03%) students had partial understanding of concept and 494 (53.35%) students had complete misunderstanding of concept or misconception.

Table_4.77 Student's Reasons and Source of Knowledge (Biology)

Item No. 73	Nerve cells are specialised to send electrical signal.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	272(29.37)	55(20.22)	217(79.78)	654(70.63)	66(10.09)	588(89.90)
Source of Knowledge						
Books		23(41.82)	159(73.27)		30(45.45)	326(55.44)
Teachers		20(36.36)	52(23.96)		20(30.30)	202(34.35)
Peers		4(7.27)	2(0.92)		8(12.12)	40(6.80)
Parents		4(7.27)	2(0.92)		4(6.06)	10(1.70)
Observation /Experience		4(7.27)	2(0.92)		4(6.06)	10(1.70)

Graph_4.77 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.77 it is evident that regarding item No.73 out of 926 students 272 (29.37%) students had given correct answers. Out of 272 (29.37%) students who had given correct answers 55 (20.22%) students had given correct reasoning while 217 (79.78%) students had given incorrect reasoning. Out of 55 (20.22%) students who had given correct reasoning 23 (41.82%) students considered books as their primary source of knowledge followed by teachers-20 (36.36%), peers-4 (7.27%), parents-4 (7.27%) and observation/experience-4 (7.27%). Out of 217 (29.37%) students who had given incorrect reasoning 159 (73.27%) students considered books as their primary source of knowledge followed by teachers-52 (23.96%), peers-2 (0.92%), parents-2 (0.92%) and observation/experience-2 (0.92%).

While out of 926 students 654 (70.63%) students had given incorrect answers. Out of 654 (70.63%) students who had given incorrect answers 66 (10.09%) students had given correct reasoning while 588 (89.90%) students had given incorrect reasoning. Out of 66 (10.09%) students who had given correct reasoning, 30 (45.45 %) students considered books as their primary source of knowledge followed by teachers-20 (30.30%), peers-8 (12.12%), parents-4 (6.06 %) and observation/experience-4 (6.06%). Out of 588 (89.90%) students who had given incorrect reasoning, 326 (55.44%) students considered books as their primary source of knowledge followed by teachers-202 (34.35%), peers-40 (6.80%), parents-10 (1.70%) and observation/experience-10 (1.70%).

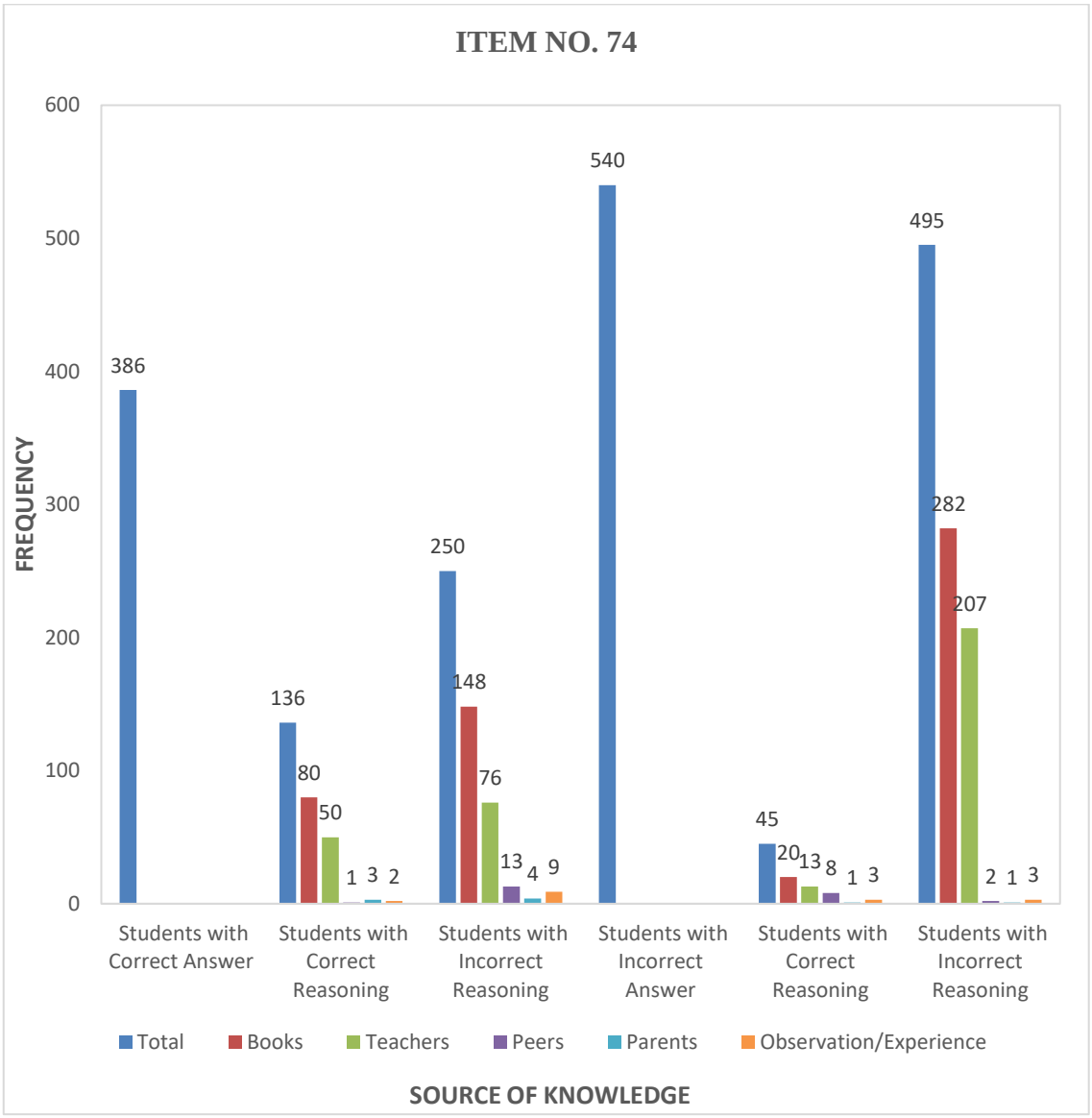
Out of 926 students 538 (58.09 %) students considered books as their primary source of knowledge followed by teachers 294 (31.74 %), peers 54 (5.83%), parents 20 (2.15%) and observations/experiences 20 (2.15%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 153 (16.53 %) students had complete understanding of concept, 204 (22.03 %) students had partial understanding of concept and 494 (53.35%) students had complete misunderstanding of concept or misconception.

Table_4.78 Student's Reasons and Source of Knowledge (Biology)

Item No. 74	The shape and size of living cells are same.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	386(41.86)	136(35.23)	250(64.77)	540(58.32)	45(10.00)	495(90.00)
Source of Knowledge						
Books		80(58.82)	148(59.20)		20(44.44)	282(56.97)
Teachers		50(36.76)	76(30.40)		13(28.89)	207(41.82)
Peers		1(0.74)	13(5.26)		8(17.78)	2(0.40)
Parents		3(2.21)	4(1.60)		1(2.22)	1(0.20)
Observation /Experience		2(1.47)	9(3.60)		3(6.67)	3(0.61)

Graph_4.78 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.78 it is evident that regarding item No.74 out of 926 students 386 (41.86%) students had given correct answers. Out of 386 (41.86 %) students who had given correct answers 136 (35.23%) students had given correct reasoning while 250 (64.77%) students had given incorrect reasoning. Out of 136 (35.23%) students who had given correct reasoning 80 (58.82%)students considered books as their primary source of knowledge followed by teachers-50 (36.76%), peers-1 (0.74%), parents-3 (2.21%) and observation/experience-2 (1.47%). Out of 250 (64.77%) students who had given incorrect reasoning 148 (59.20%) students considered books as their primary source of knowledge followed by teachers-76 (30.40%), peers-13 (5.26%), parents-4 (1.60%) and observation/experience-9 (3.60%).

While out of 926 students 540 (58.32%) students had given incorrect answers. Out of 540 (58.32%) students who had given incorrect answers 45 (10%) students had given correct reasoning while 495 (90%) students had given incorrect reasoning. Out of 45 (10%) students who had given correct reasoning, 20 (44.44%) students considered books as their primary source of knowledge followed by teachers-13 (28.89%), peers-8 (17.78%), parents-1 (2.22%) and observation/experience-3 (6.67%). Out of 495 (90%) students who had given incorrect reasoning, 282 (56.97%) students considered books as their primary source of knowledge followed by teachers-207 (41.82%), peers-2 (0.40%), parents-1 (0.20%) and observation/experience-3 (0.61%).

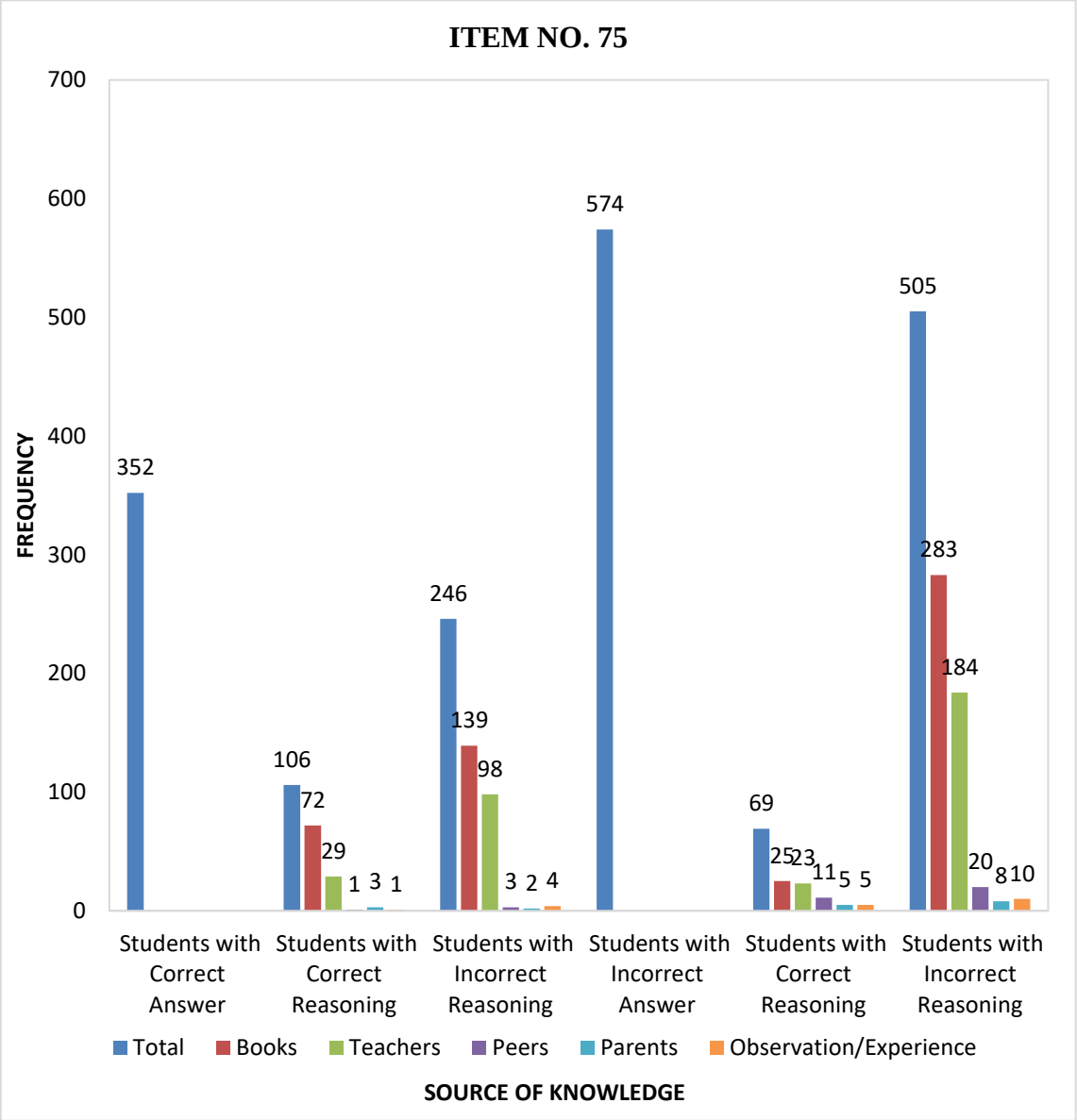
Out of 926 students 530 (57.23%) students considered books as their primary source of knowledge followed by teachers 346 (37.36%), peers 24 (2.59%), parents 9 (0.97%) and observations/experiences 17 (1.83%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 136 (14.68%) students had complete understanding of concept, 295 (31.85%) students had partial understanding of concept and 495 (53.47%) students had complete misunderstanding of concept or misconception.

Table_4.79 Student's Reasons and Source of Knowledge (Biology)

Item No. 75	Chloroplast helps in photosynthesis in plants.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	352(38.01)	106(30.11)	246(69.89)	574(61.99)	69(12.02)	505(87.98)
Source of Knowledge						
Books		72(67.92)	139(56.50)		25(36.23)	283(56.04)
Teachers		29(27.36)	98(39.84)		23(33.33)	184(36.44)
Peers		1(0.94)	3(1.22)		11(15.94)	20(3.96)
Parents		3(2.83)	2(0.81)		5(7.25)	8(1.58)
Observation /Experience		1(0.94)	4(1.63)		5(7.25)	10(1.98)

Graph_4.79 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.79 it is evident that regarding item No.75 out of 926 students 352 (38.01%) students had given correct answers. Out of 352 (38.01%) students who had given correct answers 106 (30.11%) students had given correct reasoning while 246 (69.89%) students had given incorrect reasoning. Out of 106 (30.11%) students who had given correct reasoning 72 (67.92%) students considered books as their primary source of knowledge followed by teachers-29 (27.36%), peers-1 (0.94%), parents-3 (2.83%) and observation/experience-1 (0.94%). Out of 246 (69.89%) students who had given incorrect reasoning 139 (56.50%) students considered books as their primary source of knowledge followed by teachers-98 (39.84%), peers-3 (1.22%), parents-2 (0.81%) and observation/experiences-4 (1.63%).

While out of 926 students 574 (61.99%) students had given incorrect answers. Out of 574 (61.99%) students who had given incorrect answers 69 (12.02%) students had given correct reasoning while 505 (87.98%) students had given incorrect reasoning. Out of 69 (12.02%) students who had given correct reasoning, 25 (36.23%) students considered books as their primary source of knowledge followed by teachers-23 (33.33%), peers-11 (15.94 %), parents-5 (7.25%) and observation/experience-5 (7.25%). Out of 505 (87.98%) students who had given incorrect reasoning, 283 (56.04%) students considered books as their primary source of knowledge followed by teachers-184 (36.44%), peers-20 (3.96%), parents-8 (1.58%) and observation/experience-10 (1.98%).

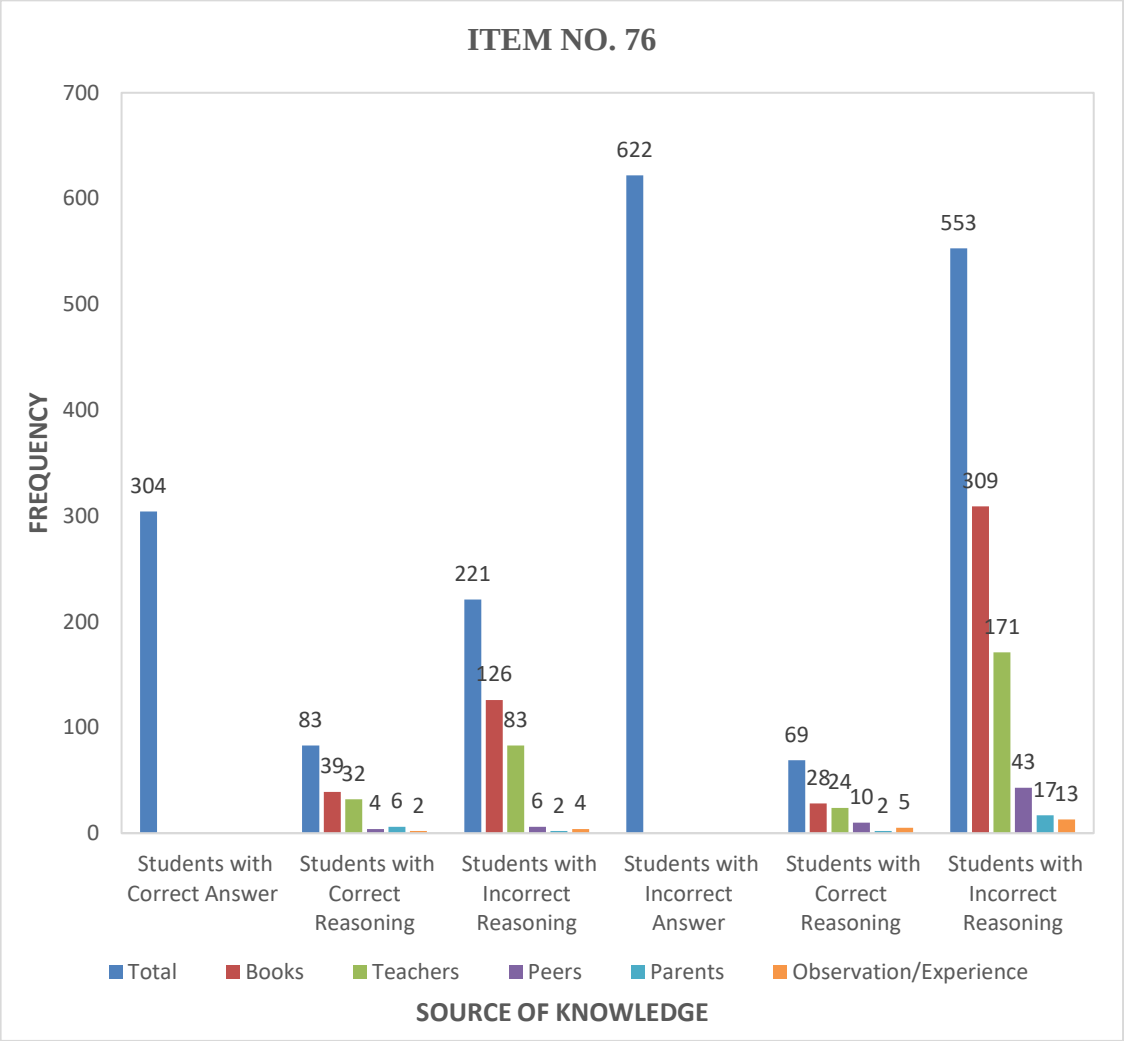
Out of 926 students 519 (56.04%) students considered books as their primary source of knowledge followed by teachers 334 (28.18%), peers 35 (1.72%), parents 18 (1.40%) and observations/experiences 20 (3.23 %). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 106 (11.45%) students had complete understanding of concept, 315 (34.02%) students had partial understanding of concept and 505 (54.53%) students had complete misunderstanding of concept or misconception.

Table_4.80 Student's Reasons and Source of Knowledge (Biology)

Item No. 76	An Ostrich egg is a single celled structure.					
	Correct Answers			Incorrect Answers		
Total Students	Frequency & (%) of Students with Correct Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning	Frequency & (%) of Students with Incorrect Answer	Frequency & (%) of Students with Correct Reasoning	Frequency & (%) of Students with Incorrect Reasoning
926	304(32.83)	83(27.30)	221(72.70)	622(67.17)	69(11.09)	553(88.91)
Source of Knowledge						
Books		39(46.99)	126(57.01)		28(40.58)	309(55.88)
Teachers		32(38.55)	83(37.56)		24(34.78)	171(30.92)
Peers		4(4.82)	6(2.71)		10(14.49)	43(7.78)
Parents		6(7.23)	2(0.90)		2(2.90)	17(3.07)
Observation /Experience		2(2.41)	4(1.81)		5(7.25)	13(2.35)

Graph_4.80 Students Reasons and Source of Knowledge (Biology)



From table and graph 4.80 it is evident that regarding item No.76 out of 926 students 304 (32.83%) students had given correct answers. Out of 304 (32.83%) students who had given correct answers 83 (27.30%) students had given correct reasoning while 221 (72. 70%) students had given incorrect reasoning. Out of 83 (27.30%) students who had given correct reasoning 39 (46.99%) students considered books as their primary source of knowledge followed by teachers-32 (38.55%), peers-4 (4.82%), parents-6 (7.23%) and observation/experience-2. Out of 221 (72.70%) students who had given incorrect reasoning 126 (57.01%) students considered books as their primary source of knowledge followed by teachers-83 (37.56%), peers-6 (2.71%), parents-2 (0.90%) and observation/experience-4 (1.81%).

While out of 926 students 622 (67.17%) students had given incorrect answers. Out of 622 (67.17%) students who had given incorrect answers 69 (11.09 %) students had given correct reasoning while 553 (88.91%) students had given incorrect reasoning. Out of 69 (11.09%) students who had given correct reasoning, 28 (40.58%) students considered books as their primary source of knowledge followed by teachers-24 (34.78 %), peers-10 (14.49%), parents-2 (2.92%) and observation/experience-5 (7.25%). Out of 553 (88.91%) students who had given incorrect reasoning, 309 (55.88%) students considered books as their primary source of knowledge followed by teachers-171 (30.92 %), peers-43 (7.78%), parents-17 (3.07%) and observation/experience-13 (2.35%).

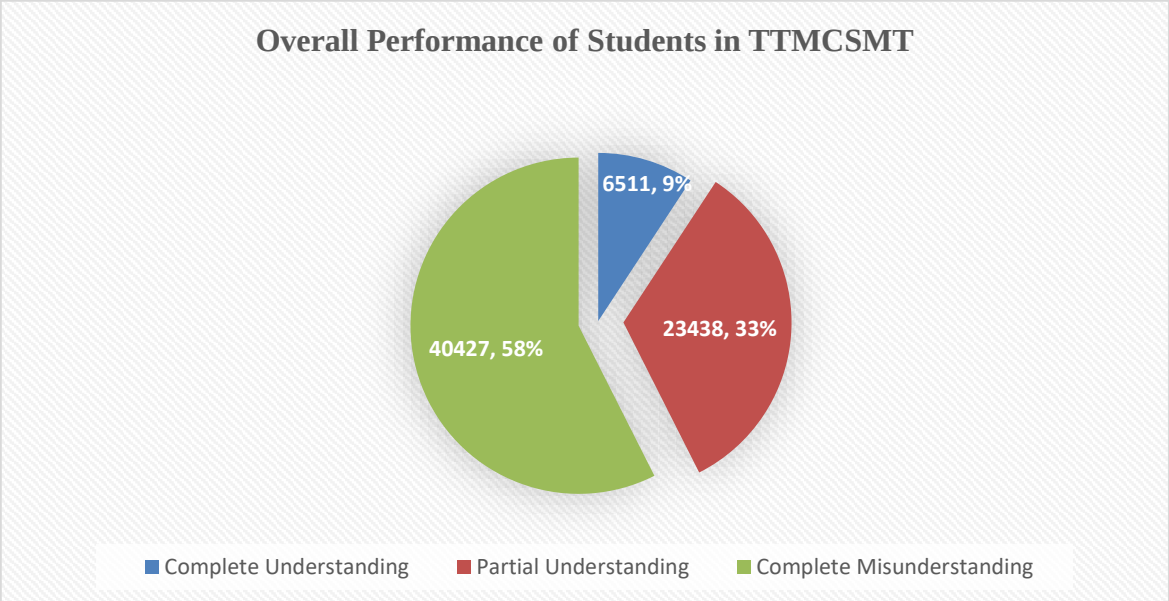
Out of 926 students 502 (54.21%) students considered books as their primary source of knowledge followed by teachers 310 (33.74%), peers 63 (6.80%), parents 27 (2.91%) and observations/experiences 24 (2.59%). Thus, it can be concluded that majority of students considered books as their primary source of knowledge.

Thus, it can be concluded that out of 926 students 83 (8.96%) students had complete understanding of concept, 290 (31.32%) students had partial understanding of concept and 553 (59.72%) students had complete misunderstanding of concept or misconceptions in science.

Table_4.81 Overall Performance of Students in TTMCSMT

Complete Understanding	Partial Understanding	Complete Misunderstanding
6511 (9.26%)	23438 (33.30%)	40427 (57.44%)

Graph_4.81 Overall Performance of Students in TTMCSMT

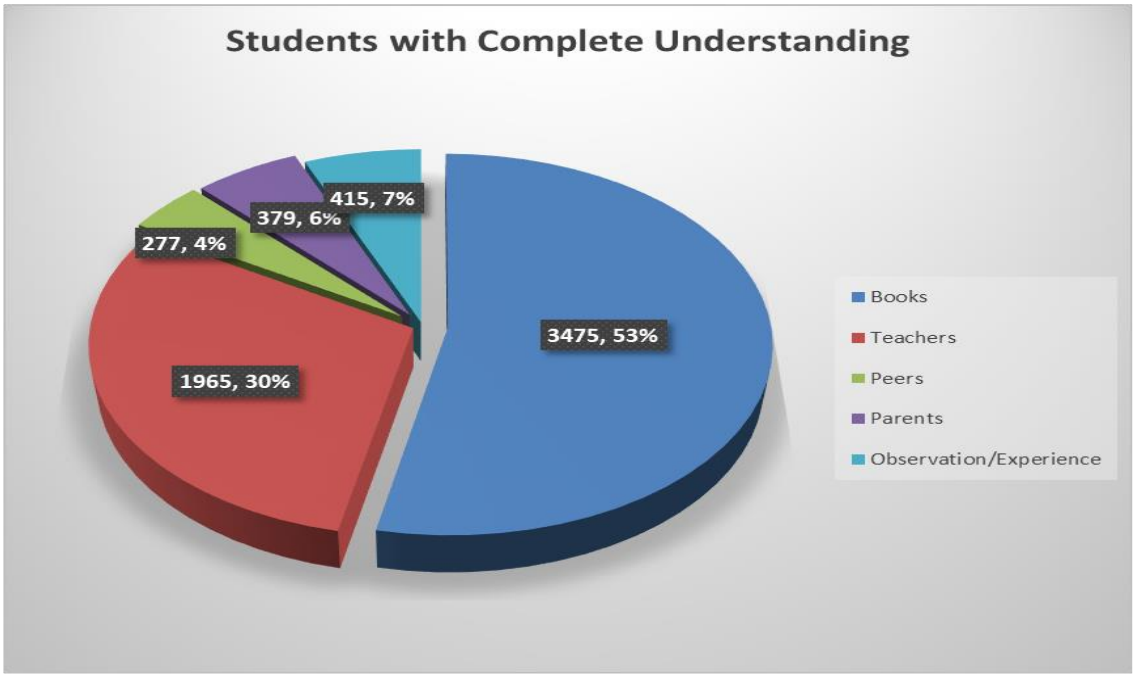


From table 4.8 and graph 4.81 it is evident that only 9.26% of students had complete understanding of scientific concepts, whereas 33.30% of students had partial understanding of scientific concepts and 57.44% of students had complete misunderstanding or misconceptions in science. Thus, it can be concluded that majority of students had either partial understanding or misconceptions in science.

Table_4.82 Overall Source of Student's Knowledge

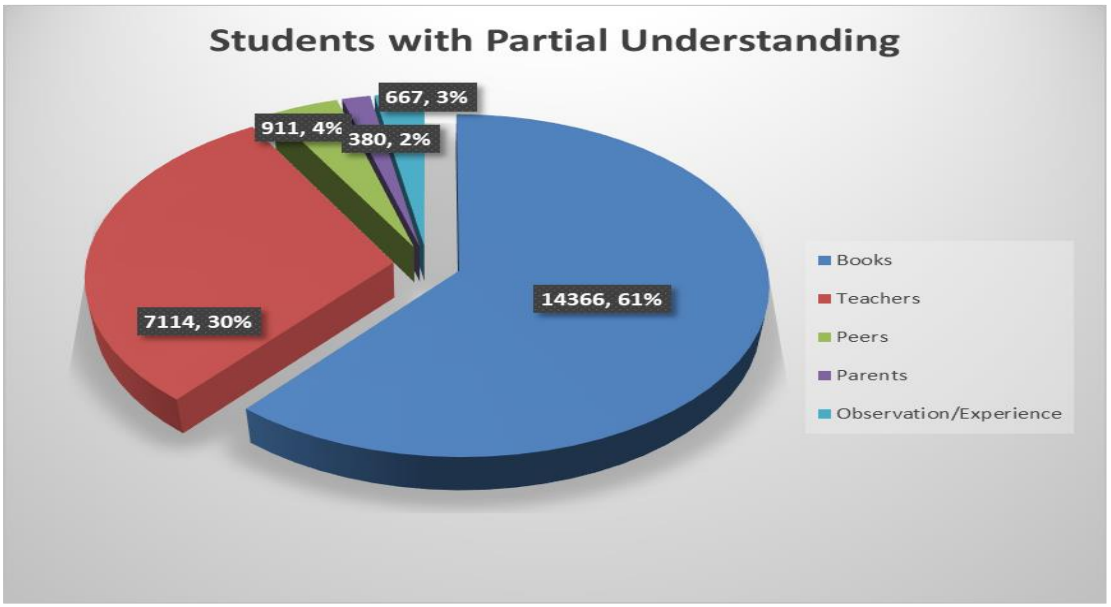
Source of Knowledge	Complete Understanding	Partial Understanding	Complete Misunderstanding
Books	3475 (53.37 %)	14366 (61.29 %)	25942 (64.16 %)
Teachers	1965 (30.17 %)	7114 (30.35 %)	11907 (29.45 %)
Peers	277 (4.25 %)	911 (3.88 %)	1444 (3.57 %)
Parents	379 (5.82 %)	380 (1.62 %)	486 (1.20 %)
Observation/ Experience	415 (6.37 %)	667 (2.84 %)	648 (1.60 %)

Graph_4.82 Student's Source of Knowledge with Complete Understanding



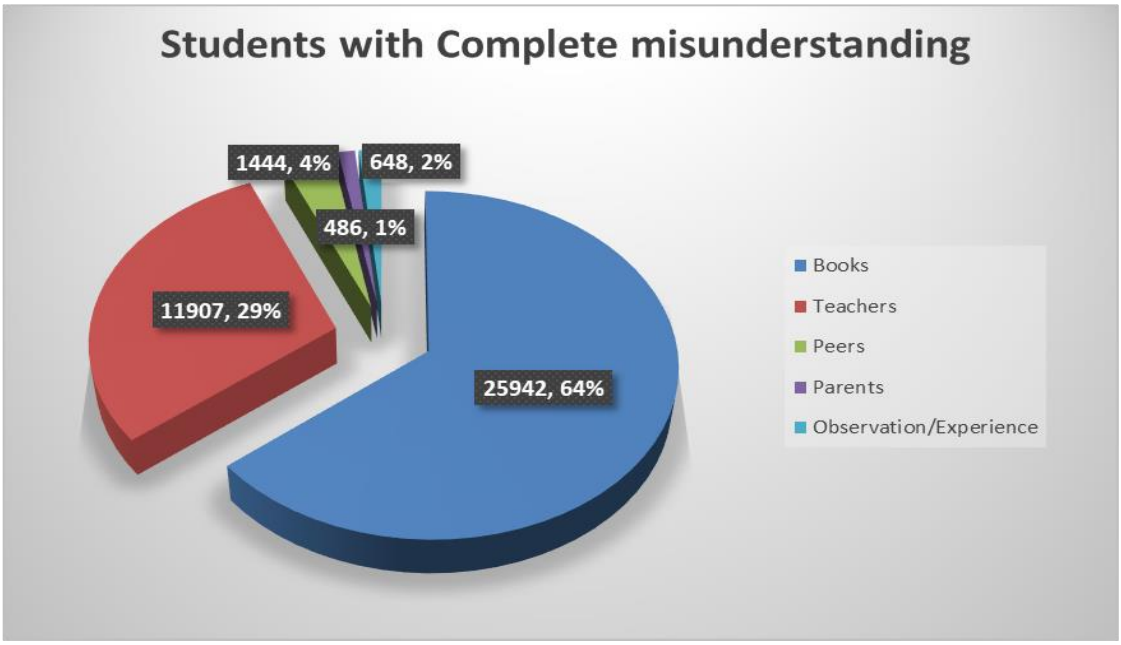
From table 4.82 and graph 4.82 it is evident that fifty three percent of students with complete understanding considered books as their primary source of knowledge followed by teachers thirty percent, peers four percent, parents six percent and observation/experiences seven percent.

Graph_4.83 Student's Source of Knowledge with Partial Understanding



From table 4.82 and graph 4.83 it is evident that sixty one percent of students with partial understanding considered books as their primary source of knowledge followed by teacher thirty percent, peers four percent, parents two percent and observation/experiences three percent

Graph_4.84 Student's Source of Knowledge with Complete Misunderstanding



From table 4.82 and graph 4.84 it is evident that sixty four percent of students with complete misunderstanding considered books as their primary source of knowledge followed by teacher twenty nine, peers one percent, parents four percent and observation/experiences two percent.

Thus, it is evident that around 54 % of students who had complete understanding considered books as their primary source of knowledge whereas around 65 % of students who had either partial understanding or complete misunderstanding/misconceptions considered books as their primary source of knowledge. Around 30% of students irrespective of complete understanding, partial understanding or complete misunderstanding considered teachers as their primary source of knowledge. Around 4% of students irrespective of complete understanding, partial understanding or complete misunderstanding considered peers as their primary source of knowledge. As there is very less margin in difference of percentage among students with complete understanding, partial understanding and complete misunderstanding among two sources of knowledge that is teachers and peers which is difficult to explain. However, it is observed that students with complete understanding used more of their observation skills and experiences to gain knowledge in comparison to those students who had partial understanding or complete misunderstanding/misconceptions. Parents play an important role in concept building of students with complete understanding in comparision to students with partial understanding or complete misunderstanding.

4.1.3 To Study Misconceptions in Science with respect to

a) Gender
b) Availability of teaching learning materials.
c) Availability of science laboratory.
d) Educational qualifications of teachers.
e) Professional qualification of teachers.
f) Experience of teachers.
g) Educational Qualification of parents.

Hypothesis 1: There will be no significance difference in the mean scores of misconceptions in science between boys and girls of standard VIII.

The above null hypothesis was tested by independent “t” test to determine whether there is a significant difference in mean scores of misconceptions in science between boys and girls.

Table_ 4.83 Scores of Students With Respect to Gender

Gender	N	Mean	Std. Deviation	Df	"t"	"p" Value
Boys	443	49.51	7.760	924	1.01	0.31
Girls	483	48.99	7.976			
Total	926					

At 0.05 level of Significance

From table 4.83 it is evident that the mean scores of misconceptions (incorrect responses) in science between Boys and Girls students did not differ significantly, (Df (924) = 1.01, p = 0.31; p>0.05). Moreover, the calculated value of "t" (1.01) is less than the table value of "t" (1.96). The difference of mean scores of Boys (M = 49.51) and Girls (M = 48.99) also explains the similarity of scores between the two genders. Thus, the null hypothesis "**There will be no significance difference in the mean scores of misconceptions in science between boys and girls of standard VIII" is not rejected.**

Hypothesis 2: There will be no significance difference between availability and non-availability of teaching learning material on misconceptions in science among students of standard VIII.

The above null hypothesis was tested by independent "t" test to determine whether there is a significant difference in mean scores of misconceptions in science between availability and non-availability of teaching learning material. The number of Teaching Learning Material (TLM) which were used in the schools were either two (Blackboard and Books) or three (Blackboard, Books, Charts/Diagrams).

Table_ 4.84 Scores of Students with respect to Availability of Teaching Learning Material (TLM)

TLM	N	Mean	Std. Deviation	Df	"t"	"p" Value
Two TLMs	678	49.73	7.930	924	3.12	0.01
Three TLMs	248	47.91	7.576			
Total	926					

At 0.05 level of Significance

From table 4.84 it is evident that there is a significant difference in the mean scores of misconceptions (incorrect responses) in science among students who belong to the school where two TLMs and three TLMs were used, (Df (924) = 3.12, p = 0.01; p<0.05). Moreover, the calculated value of "t" (3.12) is greater than the table value of "t" (1.96). Further the mean scores of students where three TLMs were used (M =

47.91) is significantly lower than the mean scores of students where two TLMs were used (M= 49.73). Thus, the null hypothesis "**There will be no significance difference between availability and non-availability of teaching learning material on misconceptions in science among students of standard VIII" is rejected.**

Hypothesis 3: There will be no significance difference between availability and non-availability of science laboratory on misconceptions in science among students of standard VIII.

The significance difference between availability and non-availability of science laboratory on misconceptions in science among students of standard VIII could not be established because science laboratory was available in only one school.

Hypothesis 4: There will be no significance difference between higher educational qualification and lower educational qualification of teachers on misconceptions in science among students of standard VIII.

The above null hypothesis was tested by independent "t" test to determine whether there is a significant difference in mean scores of misconceptions in science between higher educational qualification and lower educational qualification of teachers. The educational qualification of teachers was either Graduate or Post Graduate.

Table_ 4.85 Scores of Students with respect to Educational Qualification of Teachers

Educational Qualification	N	Mean	Std. Deviation	Df	"t"	"p" Value
Graduate	514	49.12	7.79	924	0.51	0.61
Post Graduate	412	49.39	7.99			
Total	926					

At 0.05 level of Significance

From table 4.85 it is evident that the mean scores of misconceptions (incorrect responses) in science among students who were taught by Graduate and Post- graduate teachers did not differ significantly, (Df (924) = 0.51, p = 0.61; p>0.05). Moreover, the calculated value of "t" (0.51) is less than the table value of "t" (1.96). Further the difference of mean scores of students who were taught by Graduate teachers (M = 49.12) and Post-graduate teachers (M = 49.39) also explains the similarity between the two educational qualifications. Thus, the null hypothesis **"There will be no significance difference between higher educational qualification and lower**

educational qualification of teachers on misconceptions in science among students of standard VIII" is not rejected.

Hypothesis 5: There will be no significance difference between higher professional qualification and lower professional qualification of teachers on misconceptions in science among students of standard VIII.

The above null hypothesis was tested by one way "ANOVA" to determine whether there is a significant difference in mean scores of misconceptions in science between higher professional qualification and lower professional qualification of teachers. The professional qualification of teachers was B.El.Ed, B.Ed or M.Ed.

Table_ 4.86 Scores of Students with respect to Professional Qualification of Teachers

Professional Qualification	N	Mean	Std. Deviation	Df	"F"	"p" Value
B.El.Ed	385	50.30	7.741	2, 923	13.83	0.01
B.Ed	406	49.24	7.843			
M.Ed.	135	46.21	7.607			
Total	926	49.24	7.874			

At 0.05 level of Significance

From table 4.86 it is evident that that there is a significant difference in the mean scores of misconceptions (incorrect responses) in science among students who were taught by B.El.Ed, B.Ed. and M.Ed. teachers, (Df (2,923) = 13.83, p = 0.01; p<0.05). Moreover, the calculated value of "F" (13.83) is greater than the table value of "F" (3.01). Further the mean scores of students who were taught by B.El.Ed. teachers (M=50.30), B.Ed. teachers (M=49.24) and M.Ed. teachers (M=46.21) also differs significantly. Hence, it can be derived that higher the professional qualification of teachers lower is the level of misconceptions among their students. Thus, the null hypothesis **"There will be no significance difference between higher professional qualification and lower professional qualification of teachers on misconceptions in science among students of standard VIII" is rejected.**

Table_4.87 Post Hoc Test (Within Group Differences)

Professional Qualification (Tukey HSD)		Mean Difference (I-J)	"p" Value
B.El.Ed	**M.Ed.**	4.086*	0.01
B.Ed	**M.Ed.**	3.029*	0.01

* The mean difference is significant at the 0.05 level

Table 4.87 explains within group differences for misconceptions in science among students between different professional qualifications of teachers (B.El.Ed., B.Ed and M.Ed.). Significant differences can be explained among the responses between B.El.Ed. and M.Ed. (I-J = 4.086, p = 0.01; P<0.05) and B.Ed. and M.Ed. (I-J = 3.029, p = 0.01; p<0.05).

Hypothesis 6: There will be no significance difference between higher experience level and lower experience level of teachers on misconceptions in science among students of standard VIII.

The above null hypothesis was tested by one way "ANOVA" to determine whether there is a significant difference in mean scores of misconceptions in science between higher experience level and lower experience level of teachers. On the basis of quartile deviation the experience level of teachers were put into three different groups of 5-8 years, 9-12 years and 13-22 years.

Table_ 4.88 Scores of Students with respect to Teachers' Experience

Experience Level	N	Mean	Std. Deviation	Df	"F"	"p" Value
5 - 8 Years	395	50.10	7.502	2, 923	6.96	0.01
9 - 12 Years	247	48.40	7.565			
13 - 22 Years	284	48.15	7.216			
Total	926	49.05	7.480			

At 0.05 level of Significance

From table 4.88 it is evident that that there is a significant difference in the mean scores of misconceptions (incorrect responses) in science among students who were taught by teachers having different experience level of 5-8 years, 9-12 years and 13-22 years (Df (2, 923) = 6.96, p = 0.01; p<0.05). Moreover, the calculated value of "F" (6.96) is greater than the table value of "F" (3.01). Further the mean scores of students who were taught by teachers having an experience of 5-8 years (M=50.10), 9-12 years (M=48.40) and 13-22 years (M=48.15) also differs significantly. Hence, it can be derived that higher the experience level of teachers lower is the level of misconceptions among their students. Thus, the null hypothesis **"There will be no significance difference between higher experience level and lower experience level of teachers on misconceptions in science among students of standard VIII" is rejected.**

Table_4.89 Post Hoc Test (Within Group Differences)

Experience Level (Tukey HSD)		Mean Difference (I-J)	"p" Value
5 - 8 Years	**9 - 12 Years**	1.698*	0.01
5 - 8 Years	**13 - 22 Years**	1.951*	0.01

*The mean difference is significant at the 0.05 level

Table 4.89 explains within group differences for misconceptions in science among students between different experience level of teachers (5-8 years, 9-12 years and 13-22 years). Significant differences can be explained among the responses between 5-8 years and 9-12 years (I-J = 1.698, p = 0.01; p<0.05) and 5-8 years and 13-22 years (I-J = 1.951, p = 0.01; p<0.05).

Hypothesis 7: There will be no significance difference between higher educational qualification and lower educational qualification of parents on misconceptions in science among students of standard VIII.

The above null hypothesis was tested by one way "ANOVA" to determine whether there is a significant difference in mean scores of misconceptions in science between higher educational qualification and lower educational qualification of parents. The educational qualification of parents were Uneducated, 10th & below, 12th, Graduate, PG & above.

Table_ 4.90 Scores of Students with respect to Educational Qualification of Parents

Education	N	Mean	Std. Deviation	Df	"F"	"p" Value
Uneducated	103	51.07	7.511	4,921	6.94	0.01
10th & Below	441	50.10	7.227			
12th	247	48.20	8.058			
Graduate	86	47.38	8.192			
PG & Above	49	46.22	10.463			
Total	926	49.24	7.874			

At 0.05 level of Significance

From table 4.90 it is evident that that there is a significant difference in the mean scores of misconceptions (incorrect responses) in science among students whose parents have different educational qualification of Uneducated, 10th & below, 12th, Graduate, PG & above (Df (4,921) = 6.94, p = 0.01; p<0.05). Moreover, the calculated value of "F" (6.94) is greater than the table value of "F" (2.39). Further the mean scores of students whose parents were Uneducated (M=51.07), 10th & below (M=50.10), 12th (M=48.20), Graduate (M=47.38), PG & above (M=46.22) differs significantly. Hence, it can be

derived that higher the educational qualification of parents lower is the level of misconceptions among their children. Thus, null hypothesis **"There will be no significance difference between higher educational qualification and lower educational qualification of parents on misconceptions in science among students of standard VIII" is rejected.**

Table_ 4.91 Post Hoc Test (Within Group Differences)

Parent's Qualification (Tukey HSD)		Mean Difference (I-J)	"p" Value
Uneducated	**12th**	2.870*	0.01
Uneducated	**Graduate**	3.684*	0.01
Uneducated	**PG & Above**	4.843*	0.01
10th & Below	**12th**	1.899*	0.02
10th & Below	**Graduate**	2.714*	0.03
10th & Below	**PG & Above**	3.873*	0.01

* The mean difference is significant at the 0.05 level

Table 4.91 explains within group differences for misconceptions in science among students between different educational level of parents (Uneducated, 10th & below, 12th, Graduate, PG & above). Significant difference can be explained between Uneducated and 12th (I-J = 2.870, p = 0.01), Uneducated and Graduate (I-J = 3.684, p = 0.01; $p<0.05$), Uneducated and PG & above (I-J = 4.843, p = 0.01; $p<0.05$), 10th & Below and 12th (I-J = 1.899, p = 0.02), 10th & Below and Graduate (I-J = 2.714, p = 0.03; $p<0.05$), and 10th & below and PG & above (I-J = 3.873, p = 0.01; $p<0.05$).

To conclude, it can be inferred that only 9 % of students had complete understanding of scientific concepts whereas around 91 % of students had either partial understanding of scientific concepts or complete misunderstanding/misconceptions in science. It was found that books followed by teachers were the primary source of knowledge among students who had either partial understanding or complete misunderstanding/misconceptions in science. Whereas students who had complete understanding of scientific concepts used more of their experiences and observation skills to gain knowledge.