



ACHIEVING EXCELLENCE THROUGH COOPERATIVE LEARNING METHOD: AN EXPERIMENTAL APPROACH

Education

Ms. Badesaba

Research Scholar, Department of Education, A.M.U., Aligarh, India.

ABSTRACT

The quality of education is highly dependent upon the pedagogy adopted by the teachers in the classroom. Secondary stage is the most crucial stage in the educational career of students. So the selection of right pedagogy is very important. This study is aimed at finding out the effectiveness of child-centered method i.e. 'cooperative learning method' over teacher-centered method i.e. 'traditional method' of teaching in the subject of Biology. The researcher employed Quasi-experimental research design. The study was conducted on ninth grade students during a period of 30 working days. Jigsaw II (Robert Slavin, 1986) strategy of cooperative learning method was used for experimental group while the traditional method of teaching was used in the comparison group. The results of the study revealed that students who were taught Biology with cooperative learning method performed better on Biology Achievement Test than their counterparts of control method. It can be concluded that cooperative learning is an effective strategy which teachers need to incorporate in teaching of Biology at secondary level.

KEYWORDS

Cooperative learning, traditional learning, academic achievement, secondary school students.

INTRODUCTION

School life, which is a preparatory stage for entering public life, provides an opportunity for study and social development of students. It develops sincerity, truthfulness, tolerance, discipline, obedience and appreciation of interrelationships among students. In school life, secondary stage is very important, because at this stage students enter in the bigger and serious part of life that is career. This stage serves as a link between the elementary and higher education. Children start to explore their options. This stage gives the wider scope about the education and career choice. Adolescents are associated with significant growth where identity, belongingness and socialization is very important and it is the secondary stage which play very important role in youth's socialization, forming their ideas and approach to justice, democracy and human rights.

At secondary stage, curriculum focuses not just to develop students knowledge about regular school subjects such as mathematics, science or literature but also focuses on to acquire life skills. Children learn how to apply knowledge to real life situations, to express their opinions and ideas, to develop attitudes and interests which enable them to take an active part in national developmental activities. This is the stage of transition to work and it is the secondary education which develops educational skills among learner. The curriculum of secondary education develops multiple abilities such as linguistic, logical, mathematical, spatial, bodily kinesthetic, musical and inter-personal abilities among the students. Teaching/learning of science encouraged students to appreciate and participate in the responsible use of science for the benefit of society. It encourages students to develop a scientific vision about different issues, so that they can help society to make rational choices when confronted with various challenges.

One of the important branch of science is Biology. Biology is one of the most interesting subject as it gives the knowledge about human body, to understand the environment, to have proper nutrition, and to know several disease and the role of medicine to cure a particular disease. It is a natural science which includes the study of all living organisms and allows the pupils to consider the system in relation to self.

As the learning of Biology provides real life experiences so the teaching of Biology must be student-centered. Today, there is an ongoing effort to improve the quality of education. The quality of education is highly depends upon the instructional approach used by the teachers in the classroom. In order to achieve educational excellence the teacher must chose right pedagogy. Traditional method of teaching which commonly use in school is teacher-centered. It is a 'chalk and talk' method that focuses on rote-learning and memorization. To achieve the goal of holistic development of students, the teachers need to choose effective teaching and learning approach that must be learner-centered. Each student must learn in an environment where their unique talents are recognized and their needs are addressed. In this situation, cooperative learning method is one of the best substitutes of traditional method. The importance of cooperative learning method is beyond achieving good scores and developing positive attitude towards the subject. Although these are worthwhile outcomes, but knowledge is of no use if it does not apply in

real-world (Johnson, Johnson and Holubec, 1991).

What is Cooperative Learning?

Cooperative learning is a group learning in which students work together to accomplish shared goals (Johnson, Johnson and Holubec, 1991). It is not just to sit students side-by-side at the same table to talk and one student does all the work. In cooperative learning, students must be responsible for their own and group member's work. They encourage and support each other. Unlike a competitive classroom where students are graded on norm-referenced basis, to work more faster than their classmates, students in cooperative classroom sink or swim together. In cooperative situation, there is a positive interdependence among the students. They start to think that they can achieve their goals if the other students in their group success to achieve their goals. Theoretically the concept of cooperative learning comes out from the philosophy of social constructivism which believes that knowledge is constructed through social interaction with others (Sangeeta, 2015).

There are five essential components that must be included in group learning to make it truly cooperative (Johnson, Johnson and Holubec, 1991).

Positive Interdependence:

This means the students linked with group mates in such a way that they cannot achieve success unless their peers do and vice versa. Students do the assigned task and ensure that all members of their group complete the assigned task.

Individual Accountability/Personal Responsibility:

Cooperative learning makes each student a stronger individual. Each member of the group must be strengthened by learning cooperatively. The performance of each student must be assessed by giving an individual test to each member, and randomly select one student's test to evaluate the entire group.

Face-To-face Promotive Interaction:

This means that students help, support, encourage, and facilitate the efforts of co-learners for achieving shared goals.

Interpersonal And Small Group Skills:

Putting students in a group is not a guarantee that they support each other. In order to achieve shared goals, students must know and trust each other, provide effective leadership, communicate accurately and resolve conflicts. For a cooperative group to be productive, students must taught social skills.

Group Processing:

The member of a group discusses how well they are achieving their common goals and maintains good working relationships. They discuss what actions of members were helpful and unhelpful and make decision about what actions to retain or change.

In a classroom, teacher presents the content to heterogeneous class and face the problem of 'In whose Zone of Proximal Development do we

teach' (Kagan, S., 2009). Cooperative learning method provides a solution of the problem by making heterogeneous groups. A heterogeneous group includes high achiever, low achiever, and middle achiever. In this type of grouping students automatically adjust their level of help to their groupmates' level of need (Kagan, S., 2009). Peer tutoring occur as per the understanding level of teammates. In traditional classroom, teachers deliver the lecture and students practice independently. Because the classrooms are heterogeneous with regard to mental level, any assignment may be too easy for some students and too difficult for others. Students for whom the assignment is too difficult and do not receive any coaching, struggle with understanding the concepts, practice wrong, and sometimes pretending to understand when really they do not (Kagan, S., 2009). They feel shy to ask any question from the teacher. But students in cooperative learning clear their doubts by asking from the teammates. Students' role change simultaneously from a learner to a tutor. Low achiever benefitted from high achiever and high achiever benefitted by tutoring to low achiever, as when we teach we learn more.

To identify the effect of cooperative learning method on Biology achievement of secondary school students, the researcher conducted this study in secondary school in Aligarh, U.P., India. Indian classrooms are heterogeneous classrooms, not only in terms of achievement but also in terms of religion, caste, class, living area etc. Conflicting and competitive atmosphere are likely to happen in multicultural classrooms (Mohanty and Roy, 2013). Cooperative learning environment encourages students to communicate, provide mutual support and celebrate their joint success. Yaduvanshi and Singh (2018) mentioned from the findings of his study which has been conducted to compare the Biology achievement of rural and urban background students by using traditional and cooperative learning method that at the beginning of the treatment, students from urban background refused to work with low achieving rural students. But at the end of the treatment they become friends. They enjoy teamwork, group discussion and group debates. Cooperative learning method fills the gap of locality. Many research studies demonstrate that cooperative learning boost students academic achievement, close the achievement gap, improve peer relations, and develop social skills among students (Kagan, S., 2009). Findings of many research studies revealed that cooperative learning method improve students achievement in Biology (Muraya & Kimamo, 2011; Nnorom, 2015; Rabgay, 2015; Yaduvanshi & Singh, 2018; Etokeren & Okwelle, 2019). Many researcher explored the impact of cooperative learning method on certain demographic variables and found that there was no significant difference in the academic achievement of students on the basis of gender (Muraya & Kimamo, 2011; Mobark, 2014; Ajaja & Eravwok, 2010; Etokeren & Okwelle, 2019) and place of living (Etokeren & Okwelle, 2019). Hence, this study aimed at identifying the effect of cooperative learning method on Biology achievement of secondary school students.

The objectives of the study were:

1. To study the significant difference in the pre-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method and through traditional method.
2. To study the significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method and through traditional method.
3. To study the significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to gender, time spend on using mobile, active on social sites, and type of channel they prefer to watch.

Hypothesis

H₀₁ : There is no significant difference in the pre-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method and through traditional method.

H₀₂ : There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method and through traditional method.

H₀₃ : There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to

gender.

H₀₄ : There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to students active on social sites.

H₀₅ : There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to time spend on using mobile.

H₀₆ : There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to type of channel they prefer to watch.

METHOD

The researcher used quasi-experimental design (non-randomized control group, Pre-test-Post-test design (Koul, L., 2009), which provides as much control as possible. The participants of this study were the ninth grade students of Modern Convent Inter College, Aligarh, U.P., India. In order to get equivalent experimental and control group, the researcher administered Previous Knowledge Test on all the students and the results were analyzed. On the basis of score in Previous Knowledge Test two equivalent groups were selected for the study. The researcher selected only those students who scored above 50 percent marks in the test. The criterion was decided to select only average and good students with the purpose of controlling intervening variables. Those students who did not qualify the criteria were allowed to sit in the class but were not included in the study. They were subjected to all the procedure that was carried out by the investigator but there results were not included in the main data. Although from precautions point of view, the investigator did not disclosed to any student whether he/she is included in the experiment or not. After selecting the homogeneous groups the researcher randomly assigned one group as experimental group and the other as control group. In this way the researcher tried to control various demographic variables (gender, class, caste, religion, and living place), socio-economic status, and psychological variable (intelligence).

The purpose of the study is to analyze the effect of cooperative learning method on achievement in Biology among secondary school students. There are various strategies (Jigsaw, STAD, TGT, Think-pair-share etc.) which may be used for learning through cooperative method. Out of them Jigsaw strategy and STAD are most prominently used (Tabiolo & Rogayan, 2019; Nduji et al (2020); Dhull & Verma (2019); Yaduvanshi & Singh (2018); Balfakih, 2003) for teaching science. Apart from that jigsaw strategy (Tabiolo & Rogayan, 2019; Nduji et al (2020); Dhull & Verma (2019); Mehta & Kulshrestha, 2014) has been widely used by the researchers. In this strategy it is feasible to divide the content equally to all the sub-groups. Therefore, the investigator found it the most appropriate one to be used in the present investigation.

Once the two groups were formed, pre-test was given to both the groups and then one group was taught by cooperative learning method and the other group was taught by traditional method. After the experiment, post-test was given to both the groups and the difference between the scores of both pre and post test were compared to ascertain the effect of the cooperative learning method.

Biology Achievement Test (BAT)

In order to evaluate students' knowledge, understanding and application of fundamental concepts of the topics chosen for the study, the researcher constructed a standardized test of Biology Achievement. In initial draft, 65 multiple choice type items were constructed by the researcher and given to 10 experts for checking the content validity. Content Validity Index (CVI) was calculated for checking the unanimity of the experts. CVI for an item should not be less than 0.78 (Yusoff, M. S. B., 2019). After calculating CVI, 60 items were selected for the first draft of the test. The first draft was administered on 507 students of 9th class. For Hindi medium students the test was given in both Hindi and English language.

Item analysis was carried out in accordance with Kelley's (1939) method. Following the suggestions of Kelley (1939) the upper 27% and the lower 27% of examinees were selected and three kinds of information, namely item difficulty, discriminating power, and distracter analysis of items were computed.

After calculating the difficulty value and discrimination power, six items were deleted by the researcher. Analyses of these items indicated that these items were either too easy or too difficult or have negative discrimination.

For checking the reliability, final draft of the test (54 items) was administered on 660 students of 9th class. Reliability of the test was calculated by Split-half Method and KR20 Method. The split-half reliability (odd-even method) of the test was 0.84 and Kuder-Richardson reliability was found to be 0.92. Validity of the test was established by approaching to 10 experts in the field of science. On the basis of response of the experts S-CVI/Ave (Scale-level content validity index based on the average method) was found to be 0.97 (0.94).

RESULTS

Analysis of the study reported following results based on the objectives stated above:

H₀₁ : *There is no significant difference in the pre-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method and through traditional method.*

Table 1: Independent T-test Comparing Means Of Students' Pre-test Scores Of Biology Achievement Between Experimental And Control Groups.

Groups	N	Mean	s.d.	df	't' value	Sig.
Experimental Group	41	13.70	2.40	79	1.38	.170
Control Group	40	13.00	2.18			

Table 1, revealed that the mean of achievement scores of experimental group (13.70) was slightly higher than the control group (13.00). But the difference between these two pre-test mean scores was not significant ($t(79) = 1.38, p > 0.05$), which revealed that the performance of both the groups were equivalent before the treatment.

H₀₂ : *There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method and through traditional method.*

Table 2: Independent T-test Comparing Means Of Students' Post-test Scores Of Biology Achievement Between Experimental And Control Groups.

Groups	N	Mean	s.d.	df	't' value	Sig.
Experimental Group	41	43.41	3.94	79	9.28	.000
Control Group	40	34.70	4.49			

Table 2, revealed that the mean of achievement scores of experimental group (43.41) was greater than the control group (34.70) and the difference between these two post-test mean scores was significant ($t(79) = 9.28, p < 0.05$). As such cooperative learning positively affects students' Biology achievement.

H₀₃ : *There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to gender.*

Table 3: Independent T-test Comparing Means Of Students' Post-test Scores Of Biology Achievement Teaching Through Cooperative Learning Method In Relation To Gender.

Gender	N	Mean	s.d.	df	't' value	Sig.
Male	23	43.30	3.69	39	.20	.84
Female	18	43.55	4.34			

Table 3, revealed that the difference between these two post-test mean scores was not significant ($t(39) = .20, p > 0.05$). In this way null hypothesis three (**H₀₃**) was accepted which implied that there was no significant difference in the Biology achievement of male and female students of experimental group.

H₀₄ : *There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to students active on social sites.*

Table 4: Independent T-test Comparing Means Of Students' Post-

test Scores Of Biology Achievement Teaching Through Cooperative Learning Method In Relation To Students Active On Social Sites.

Active on social sites	N	Mean	s.d.	df	't' value	Sig.
Yes	26	43.88	4.25	39	1.00	.32
No	15	42.60	3.31			

Table 4, revealed that the difference between these two post-test mean scores was not significant ($t(39) = 1.00, p > 0.05$). Although the mean achievement scores of students who were active on social sites was slightly higher than those who were not active on social sites, but the difference was not significant.

H₀₅ : *There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to time spend on using mobile.*

Table: One-way ANOVA To Compare The Means Of Experimental Groups' Post-test Scores In Relation To Time Spend On Using Mobile.

Time spend on using mobile	N	Mean	s.d.	F	Sig.
One hour	11	42.18	3.57	1.75	.17
Two hour	17	43.41	4.07		
Three hour	6	46.50	3.61		
Four hour	7	42.71	3.77		

From table 5, it is evident that F value of 1.75 with df (3, 37) was not significant at 0.05 level of significance. The results revealed that the time spent by the students in using mobile phones do not affect their achievement. All the learners were equally benefited from cooperative learning method.

H₀₆ : *There is no significant difference in the post-test scores of achievement test in Biology of secondary school students teaching through Jigsaw II strategy of cooperative learning method in relation to type of channel they prefer to watch.*

Table: One-way ANOVA To Compare The Means Of Experimental Groups' Post-test Scores In Relation To Type Of Channel Students Prefer To Watch.

Type of channel prefer to watch	N	Mean	s.d.	F	Sig.
Entertainment	15	44.00	4.08	.68	.56
Movies	7	42.14	3.71		
Music	10	44.30	4.16		
Sports	9	42.44	3.81		

From table 4.5, it is evident that F value of .68 with df (3, 37) was not significant at 0.05 level of significance. The results revealed that the type of channel students prefer to watch do not affect their achievement.

DISCUSSION AND CONCLUSION

To study the excellence of cooperative learning method in improving students academic achievement, the research was carried out on ninth grade students of Modern Convent Inter College, Aligarh, U.P., India. The analysis of independent sample t-test produced the results in favour of cooperative learning method. Students who taught Biology using Jigsaw II strategy of cooperative learning method perform better on post-test. The findings of the study are consistent with the findings of previous researches (Muraya & Kimamo, 2011; Nnorom, 2015; Rabgay, 2015; Yaduvanshi & Singh, 2018; Etokeren & Okwelle, 2019).

The study also explored the impact of cooperative learning method on certain demographic variables and found that there was no significant difference in the post-test scores of experimental group on the basis of gender. Cooperative learning is a gender friendly method. Both the groups performed better on achievement test. This finding is consistent with the findings of: Muraya & Kimamo, 2011; Mobark, 2014; Ajaja & Eravwok, 2010; Etokeren & Okwelle, 2019. The continuous use of social media results in lower grades and poor academic performance of students (Kaur, N, 2018). But the results of present study shows that there was no significant difference in the academic achievement of students taught by cooperative learning method on the basis of time spent on using mobile phones and whether they were active on social sites. One reason for this may be the continuous involvement of students in cooperative groups. Students learn and tutor to each other

that strengthen their knowledge. In recent years mobile phone have become a necessary part of daily life and affect the life of people of almost every age groups. Some students have the habit of keeping their phones on during classes. Especially in traditional lecture method classroom, backbenchers have the chance of using mobile phones that distract their learning. But in cooperative learning classroom, the chance of using mobile phones is reduced because cooperative learning makes each individual a responsible member of the group. They have less chance of using mobile phones. In order to study the effect of type of channels students prefer to watch on their academic achievement, researcher found no significant difference in the post-test scores of experimental group.

On the basis of findings, it can be concluded that cooperative learning is an effective method which teachers need to incorporate in teaching of Biology.

Problems Faced By The Teachers While Implementing Cooperative Learning Method In Their Classroom

The most challenging experience in implementing cooperative learning was in India (Kagan, S., 2009). In India, there were over seventy students per class and the size of the rooms much smaller than what is common in Europe or the USA (Kagan, S., 2009).

There are the following problems faced by the teachers in implementing cooperative learning method in Indian classrooms:

1. Furniture arrangements

The main problem faced by the teachers is furniture arrangements as the classrooms literally packed with students. It is very difficult for students to sit in a 'knee to knee' and 'eye to eye' position.

2. Managing noise

During cooperative learning managing noise is very difficult for the teachers, because students need to discuss and tutor to each others. Apart from this students need to shift from home groups to expert groups and then return back to their home groups.

3. Time management

Every student learns at different pace of learning. All the groups finish their task at different times. This situation not only waste valuable classroom time but also creates the problem of discipline. Groups, who complete their task early, start to disturb the whole class.

4. Interpersonal problems

In order to create heterogeneous groups in cooperative learning classrooms, students of different ability level, gender, caste, class etc. need to sit at the same table. High achiever refuse to work with low achiever and female students generally prefer to work with a female group.

5. Absences or lack of class attendance

Absences or lack of class attendance is a big challenge for teachers, because teacher cannot control if a student is not present in class. Absence of a group member hinders the progress of the group and develops an additional burden on the group members.

6. Evaluation system

The evaluation system of cooperative learning method involves giving a group mark. This evaluation system becomes biased when all the students do not contributed equally to the final result. High ability students receive low grades due to the poor performance of low ability students.

But when there is a will, there is a way. All the above mentioned problems can be solved by proper training of the teachers. As the researches shows that cooperative learning is an effective method for improving student's academic achievements, teachers must incorporate this method in their classroom. On the basis of findings of the study following recommendations are made:

- i. Cooperative learning improves students' academic achievement in Biology and also increases student's interest towards the subject. This method can also be implemented in other science, mathematics subjects at secondary and senior secondary level.
- ii. In cooperative learning, besides being a subject matter expert, the teacher also play the role of classroom manager. Proper training of the teachers is very important. Teachers must know how to structures the learning groups, teach basic concepts, and monitors the proper functioning of the groups.

REFERENCES

1. Ajaja, O. P., & Eravwoke, O. U. (2010). Effects of cooperative learning strategy on junior secondary school students achievement in integrated science. *The Electronic Journal for Research in Science & Mathematics Education*, 14(1).
2. Balfakih, N. M. (2003). The effectiveness of student team-achievement division

- (STAD) for teaching high school chemistry in the United Arab Emirates. *International journal of science education*, 25(5), 605-624.
3. Dhull, P., & Verma, G. (2019). Jigsaw teaching technique for teaching science. *International Journal of Research and Analytical Reviews (IJRAR)*, 6(2), 809-815.
4. Etokeren, I. S., & Okwelle, P. C. (2019). Effect of Cooperative Learning Strategy on Biology Students' Academic Performance in Senior Secondary School in Rivers State. *Journal of Scientific Research and Reports*, 1-11.
5. Hossain, A., & Tarmizi, R. A. (2013). Effects of cooperative learning on students' achievement and attitudes in secondary mathematics. *Procedia-Social and Behavioral Sciences*, 93, 473-477.
6. Johnson, D. W., Johnson, R. T., & Holubec, E. J. (1991). *Cooperation in the classroom*. Interaction Book Company.
7. Kagan, S. & Kagan, M. (2009). *Kagan's Cooperative Learning*. San Clemente: Kagan Publishing.
8. Kaur, N (2018). Impact of Mobile Phone Usage on the Academic Performance of Students. *Pramana Research Journal*, 8(12), 2249-2976.
9. Lokesh, K. (1984). *Methodology of educational research*. Vikas publishing house.
10. Mattingly, R. M., & VanSickle, R. L. (1991). Cooperative Learning and Achievement in Social Studies: Jigsaw II.
11. Mehta, S., & Kulshrestha, A. K. (2014). Implementation of cooperative learning in science: A Developmental-cum-experimental study. *Education Research International*, 2014.
12. Mobark, W. M. (2014). Effect of using cooperative learning strategy on graduate students' academic performance and gender difference. *Journal of Education and Practice*, 5(11), 64-70.
13. Mohanty, D. A., & Roy, B. (2013). Need of Cooperative Learning in Indian Language Classroom: A Study'. *Galaxy*, 2(3), 1-4.
14. Muraya, D. N., & Kimamo, G. (2011). Effects of cooperative learning approach on biology mean achievement scores of secondary school students in Machakos District, Kenya. *Educational Research and Reviews*, 6(12), 726-745.
15. Nduji, C. C., Nwandikor, C., Keziah, B. C., & Elejere, U. C. (2020). Effect of Jigsaw Based Cooperative Learning Strategy (JBCLS) on senior secondary school students' interest and achievement in physics. *International Journal of Studies in Education*, 16(1), 164-168.
16. Nnorom, N. R. (2015). Effect of cooperative learning instructional strategy on senior secondary school students achievement in biology in anambra state, Nigeria. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE), Special*, 5(1), 2424-2427.
17. Rabgay, T. (2018). The Effect of Using Cooperative Learning Method on Tenth Grade Students' Learning Achievement and Attitude towards Biology. *International Journal of Instruction*, 11(2), 265-280.
18. Singh, A. K. (2015). Tests, measurements and research methods in behavioural sciences. Bharati Bhawan.
19. Yaduvanshi, S., & Singh, S. (2015). Cooperative Learning: An innovative pedagogy for achieving educational excellence. *International journal of Applied Research*, 1(11), 274-279.
20. Tabiolo, J. L., & Rogayan, V. (2019). Enhancing Students' Science Achievement through Jigsaw II Strategy. *Journal of Science Learning*, 3(1), 29-35.
21. Yaduvanshi, S., & Singh, S. (2018). Effect of cooperative learning (STAD method) on Biology achievement of rural and urban students at secondary level.
22. Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Resource*, 11(2), 49-54.