

Effect Of Online Mastery Learning Strategy On Achievement In English In Relation To Cognitive Ability

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Abstract: The present study investigates the effect of online mastery learning strategy on achievement in English in relation to cognitive ability. The sample consisted of 120 students of 9th class from two private schools of Aligarh District in Uttar Pradesh affiliated to Central Board of Secondary Education, New Delhi. The study covered two independent variables viz. instructional strategies, cognitive ability. The variable of instructional strategies was studied at two levels, namely online mastery learning strategy and conventional method of teaching. The variable of cognitive ability was studied at three levels, namely high, average and low cognitive ability. The dependent variable was the performance gain which was calculated as the difference in post-test and pre-test scores. A pre-test was conducted on achievement in English. The experimental group was taught through 10 lesson plan based on online mastery learning strategy and the control group was taught through conventional method by the investigators. The post-test was conducted. The descriptive statistics techniques such as Mean, and Standard Deviation were used in the analysis of data. The F-ratio and t-test were employed to find significance of difference between means related to different groups and variables. The data was analyzed using 2x3 Analysis of Variance and following conclusions were drawn: (i) The achievement of group taught through online mastery learning strategy is much higher than that of conventional method of teaching. (ii) The performance of high cognitive ability groups was higher than that of average and low cognitive ability groups. (iii) There was significant interaction effect between online mastery learning strategies and cognitive ability on achievement in English.

Index Terms: Online Mastery Learning Strategy, Conventional Teaching Strategy, Achievement in English, Cognitive Ability

INTRODUCTION

One of the greatest challenges and opportunities of the 21st century will be for schools at all levels to focus more on asserting students to become motivated in order that they can succeed in school. We need to enforce a recognition that all children can perform at higher levels of achievement. Robinson [1] states that student's characteristics as well as societal expectations have changed, while traditional methods and modes of instruction are still employed by a large number of educators. This is leading to a growing concern that the nation's schools are unable to educate the youth and therefore, nontraditional methods and modes of instructions must be evaluated [2]. Because education is a process of empowerment by which the individuals are able to secure a better quality of life. Education should become a fun and thrill to them rather than burden and boredom. It not only imparts knowledge, skills and inculcate values but is also responsible for building human capital which breeds, drives and set technological innovation and economic growth. With the impact of modern technique along with rapid strides of development in modern instructional technique, there is strong urge to refine and improve our teaching strategies and instructional technique with a view to realizing the fullest potentialities of the individual learner [3]. Online learning has been considered as an excellent medium of transmission and retrieval of information through course notes, Brown [4]. Online education is a type of distance learning-taking courses without attending a brick-and-mortar school or university. Instead, online students and teachers interact over the internet. Online education not only enables students to take their courses anywhere at any time, but it increases student interaction, enables student centered teaching, facilitates peer to peer learning, and provides successful student learning outcomes. Students in online conditions performed modestly better, on average, than those learning the same materials through traditional face to face instructions. According to [5] online communication system offers a potentially rich social learning environment and flexibility in accessing online discussion, which can support and facilitate active group

based online learning. Online instruction system allows learners to respond at a time that best suits to them. Online education and teaching is conveying information or concepts to the learner via the computer network system, internet or web based learning environment [6]. In selecting teaching strategies, the main emphasis should be given to achieve some learning objectives rather than student's interests. The learning objectives and learning conditions are main criteria for choosing appropriate teaching strategies. In present study online mastery learning strategy has been used. Online mastery learning is an appropriate instructional strategy that provides children with the appropriate learning conditions so that they can learn. In online mastery learning the study material is delivered through the internet, audio/video tape, satellite TV and CD-ROM. It can be through self-help or instructor led. It includes media in the shape of text, image, streaming video and audio or animation. These types of online programmes are able to match face to face courses in respect of academic quality and effectiveness. These types of online programmes empower the students to learn on their own. Online mastery learning strategy is starting to be recognized as an excellent medium for learning, not just a medium for transfer of information. Online mastery learning refers to any form of learning /teaching that take place via a computer network [7]. Online mastery learning differs from the others due to its characteristics like individualization, flexibility, simulation, economical, reality based, maintainable, allow communication and can monitor actions. Academic achievement is the pivot and the center of educational growth and development. It is measured and assessed by achievement test and compared to the set norms to evaluate an individual's performance. Achievement means the amount of knowledge gained by the student in different subjects of study. It encourages the students to work hard and learn more. Also it helps the teacher to know whether their teaching methods are effective or not and help them to bring improvement accordingly [2]. Achievement refers to pupil's knowledge, attainment and skill development in the school subjects which are assured by the authorities with the help of

achievement test, in the form of examination and generally indicated by the test scores or by marks assigned by the teachers. Achievement means all those behavioral changes which take place in the individual as a result of learning experience of various kinds. It is concerned with the quality and quantity of learning attainment in a subject of study, or group of subjects, after a period of instructions [8]. It signifies successfully carried out performance by an individual or a group assessed after the completion of a task whether it is academic, manual, personal, social or extracurricular. Achievement is the outcome of the educational goals. In the present times, the measurement and evaluation of student's achievement has undergone a lot of changes. It refers to the level of success or proficiency attained in some specific skill or area. Achievement in English language would imply the proficiency in the listening, speaking, reading and writing commensurate with the age, grade or the level of skill required by the individual. According to [9] defined academic achievement as the "extent to which a learner is profiting from instructions in a given area of learning i.e., achievement is reflected by the extent to which skill or knowledge has been imparted to him". According to [10] define achievement as a specified level of proficiency in scholastic or academic work. Academic achievement has become an index of students' future in this highly competitive world. It has been one of the most important goals of the educational process. It is also a major goal, which every individual is expected to perform in all cultures. According to [11] Achievement test measure how well students have mastered the subject matter in a course of instruction. Cognitive scientists have long debated whether language and cognition are separate mental faculties, or whether languages emerge from general cognitive abilities. A hall mark of modern cognitive science is the goal of developing a theory of cognition powerful enough to encompass all human mental abilities, including language abilities. A long standing controversy concerns two ways of conceptualizing the architecture of cognition. One approach proposes that general-purpose processes and mechanisms provide a foundation for all varieties of human intelligence. We can refer to this as 'general purpose' cognition. Examples of possible universal processes are the ability to induce a category from exposure to examples (category induction), and the ability to mentally complete a known pattern when confronted with a piece of it (pattern completion). Cognitive scientists frequently attempt to precisely specify their proposed mechanisms by implementing them as computer algorithm which can be tested in artificial intelligence programs. Researchers have tried to use artificial intelligence programs to show that the same principles that can explain general problem solving can also explain aspects of language acquisition and processing. The second way of conceptualizing human cognition emphasizes the difference between language and other abilities. A key idea is that many distinct domains of cognition exist and must be learnt separately, using different mental mechanisms. This approach is referred to as the 'modularity of cognition' or 'mental modules approach.' Chomsky [12] major innovation was to conceive of language abilities as akin to mental organ. According to this view, children are born with a language acquisition device and with specific linguistic knowledge. This knowledge is thought to include the concept of noun, verb, grammatical subject and structures that constrain possible grammatical rules. In contrast to the views of the dominant

psychological theory of the 1950, behaviourism. Chomsky argued that children do not learn to speak by imitating adults. His key evidence was that children spontaneously use incorrect forms they could not have heard, like 'goed' and 'broke'. Linguistic overgeneralizations like these suggest that children are extracting rules from the language they hear, not merely imitating. Cognitive scientists have long debated whether language and cognition are separate mental faculties, or whether languages emerge from general cognitive abilities. A hall mark of modern cognitive science is the goal of developing a theory of cognition powerful enough to encompass all human mental abilities; including language abilities. Author major innovation was to conceive of language abilities as akin to mental organ. According to this view, children are born with a language acquisition device and with specific linguistic knowledge. This knowledge is thought to include the concept of noun, verb, grammatical subject and structures that constrain possible grammatical rules. Chomsky felt that children could not learn language using general purpose problem solving or regularity extraction skills. They need to come to the task with a rich set of expectations about the nature of language.

Need and Significance of the Study

In this twenty first century where English medium schools are prevalent and main focus is on the role that schools serve in educating students for a technological world. There is a little doubt that internet has become the technology of choice in learning and teaching [13]. It has been seen that there are technological advancements but students are lacking behind in the field of English language. The recent expansion of broadband access has brought internet in homes and schools and providing students and teachers with the opportunity to exploit the internet as learning and teaching tool [14]. In the coming years school life may become harder for those children who are having problems with English language in general. It is absolutely clear after seeing that curriculum being taught in the schools, students cannot progress and achieve desired achievement until unless their teachers adopt appropriate teaching strategies and technologies. In literature classes, students are often told to develop writing skills which can be done better through online teaching because online courses are more writing intensive than traditional classes. Even discussion forum is one of the most exciting features of online teaching. In the traditional classroom, a question is raised by an instructor and same group of bright students respond. In online teaching discussion occur in a new dimension where every student is expected to respond. Teachers can take help of much type of teaching aids such as power point presentation, flash cards and immediate feedback tests etc. Students can use e-mail, chat rooms and discussion boards to establish study groups. Though students do not see a teacher in the classroom every day, online students can access their teacher better. They can pose questions through e-mail and can frequently engage in a dialogue that would be difficult to organize in a face to face system. Online education is a new teaching technology which allows you to attend lectures and classes by sitting in the comfort of your home. The present paper highlights the need to know the role of online mastery learning strategies in teaching of English language. The study compares the effectiveness of different teaching methods on student's achievements in English in relation to their cognitive abilities. The study will help in finding

the answers of questions like as how we can influence students attitude towards language learning. We will be able to provide appropriate learning environment by considering the individual differences of the students, so that there could not be any hindrance in achieving target learning. Findings of the present study will be helpful to students to improve their learning skills in English language. It will also be helpful for teachers in understanding and adopting the approach of a model and break the monopoly of the conventional teaching methods. Therefore the investigator made an attempt to enquire in the effectiveness of online mastery learning strategy on achievement in English in relation to cognitive ability.

Objectives

1. To compare the achievement of groups taught through online mastery learning and conventional teaching strategy in English.
2. To compare the high, average and low groups of students of cognitive ability.
3. To study the interaction effect of instructional strategies and cognitive ability.

Hypotheses

The study will be designed to test the following hypotheses:

- H_1 : There exists significant difference between the achievements of group taught through online mastery learning strategy and conventional teaching strategy in English.
- H_2 : There exists significant difference between the achievements of students having high, average and low cognitive ability.
- H_3 : There exists significant interaction effect of instructional strategies and cognitive ability with regards to achievement.

Sample

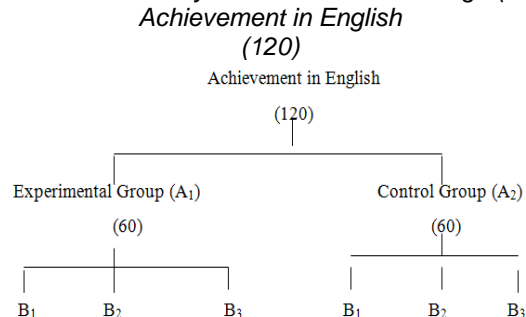
In the present paper, in order to satisfy the real effort in experimental research, the logical statistical inference of purposive and random sampling was initially employed to select two schools which have Local Area Network Facility and then random sampling technique was used. The sample of 120 English students of 9th class was drawn from two secondary schools i.e. 60 students from three Dots Public School, Aligarh and 60 students from D.S. Bal Mandir, Aligarh which were affiliated to Central Board of Secondary Education, New Delhi. The schools were fulfilling the basic requirements for the present study i.e. computer facilities and English as a medium of instruction. The study was purposed to be conducted on two intact groups i.e. experimental group and conventional group. The two intact sections of 25 students were selected from each school.

Design

The present study will be experimental in nature. One group will be treated as experimental group and another group will be treated as control group. The experimental group will be taught through online mastery learning and control group will be taught same topics with conventional teaching strategy by the investigators themselves. The study will cover two independent variables viz. instructional strategies and cognitive ability. The variable of instructional strategies will be studied at two levels, namely online mastery learning strategy

and conventional method of teaching. The variable of cognitive ability will be studied at three levels, namely high, average and low cognitive ability. The dependent variable will be performance gain which will be calculated as the difference in post-test and pre-test scores. The schematic layout of the factorial designs for achievement has been given in fig. 1.

Fig.-1: The schematic layout of the factorial design (2x3)



Here:

- A_1 stands for online mastery learning strategy
 A_2 stands for conventional teaching strategy
 B_1 stands for high cognitive ability
 B_2 stands for average cognitive ability
 B_3 stands for low cognitive ability

Procedure

After selecting the sample and allocation of the students in the groups for instructional strategies, the experiment will be conducted in five phases. Firstly, General Mental Ability Test by [15] was used to access the intelligence of student for matching the group to measure the matching the group of the students. Secondly, the Cognitive Ability Test by [16] was administered on a total sample of the students. Thirdly, an achievement test in English as pre-test was administered to the students of experimental and control groups. The answer-sheets were scored to obtain information regarding the previous knowledge of the students. Fourthly, the experimental group was taught through online mastery learning strategy and control group was taught through conventional teaching strategy by the investigators. Fifthly, after the completion of the course, the same achievement test in English as post-test was administered to the students of both the groups. The answer-sheets were scored with the help of scoring key. The difference was called gain achievement scores.

Tools

1. General Mental Ability Test by [15] was used to access the intelligence of student for matching the group.
2. Cognitive Ability Test by [16] was used.
3. An Achievement Test in English prepared by the Investigators.
4. Ten Lesson Plan based on by online mastery learning strategy and conventional method of teaching prepared by the Investigators.

Analysis and Interpretation of the Results

Analysis of Descriptive Statistics

The data were analyzed to determine the nature of the distribution of scores by employing mean and standard deviation. The two way analysis of variance was used to test

the hypotheses related to strategies of teaching and cognitive ability. The mean and standard deviation of different sub-groups have been presented in table 1.

Table 1: Mean and Standard Deviation of mean gain achievement scores in experimental and control group

Variables	Experimental Group			Control Group		Total		
	N	Mean	SD	N	Mean	N	Mean	SD
High Cognitive Ability				16	8.38	32	10.63	
Average Cognitive Ability	16	12.88	2.03	28	6.43	56	7.59	
Low Cognitive Ability	28	8.75	2.20	16	5.63	32	6.09	
Total Cognitive Ability	60	9.27	3.07	60	6.74	120	6.74	2.38

Source: Field Study, 2019

Table-1 reveals that the total mean gain scores of online mastery learning strategy (M=9.27) group are higher than that of conventional teaching strategy (M= 6.74). This shows that online mastery learning strategy is more effective than the conventional teaching strategy. It is also confirmed that the mean of the three group's i.e. high, average and low cognitive ability group is 10.63, 7.59 and 6.09 respectively. The mean gain scores of high cognitive ability are higher than that of average and low cognitive ability group in respect of teaching strategies. It shows that the achievement of high cognitive ability is high for both teaching strategies. The mean gain achievement scores of high, average and low cognitive ability group on online mastery learning strategy are higher than that of the conventional method of teaching. To probe deeper, analysis of variance is employed for the data.

Analysis of Variance on Gain Achievement Scores

The sum of squares, degree of freedom, mean sum of squares and F-ratio have been presented in table- 2.

Table 2: Summary of Analysis of Variance (2x3) factorial designs

Source of Variation	Sum of Squares	df	Mean of Sum of Squares	F-ratio
Instructional Strategy (A)	192.54	1	192.54	43.46**
Cognitive Ability (B)	346.23	2	173.11	39.08**
Interaction (A x B)	51.94	2	25.97	5.86**
Error Terms	505.29	114	4.43	

*Significant at 0.05 level **Significant at 0.01 level

(Critical Value 3.93 at 0.05 and 6.86 at 0.01 level, df 1/114)

(Critical Value 3.08 at 0.05 and 4.80 at 0.01 level, df 2/114)

Instructional Strategy (A)

Table-2 shows that the F-ratio for difference in gain achievement scores of online mastery learning strategy and conventional teaching strategy is 43.46, which in comparison to the table value was found significant at 0.01 level of significance. It shows that the groups are different beyond the contribution of chance. Hence, the hypothesis H₁: There exists

significant difference in gain achievement scores of group taught through online mastery learning strategy and conventional teaching strategy in English, is accepted. The result indicates that achievement of group taught through online mastery learning strategy is much higher than that of conventional method of teaching. In order to probe deeper, F-ratio is followed by t-test. The values of the t-ratio for different combination have been given in the table-3.

Table-3: t-ratios for mean gain achievement scores of experimental and control group

Variable	Experimental Group N Mean SD	Control Group N Mean SD	SE _D	t-value
Gain Scores	60 9.27 3.07	60 6.74 2.38	0.50	5.06**

**Significant at 0.01 level

(Critical Value 1.98 at 0.05 and 2.62 at 0.01 level, df =118)

Table-3 reveals that the mean gain achievement scores of experimental group taught through online mastery learning strategy group is 9.27, which is higher than the corresponding mean gain scores of 6.74 for the control group taught through conventional method of teaching. The t-value testing the significance of mean gain difference on achievement in English of experimental and control group is 5.06, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the hypothesis H₁: of significant difference is accepted in case of online mastery learning strategy and conventional method of teaching irrespective of grouping across other variables. The result indicates that the students taught through online mastery learning strategy perform significantly better than that of conventional method of teaching.

Cognitive Ability (B)

It has been seen from the table- 2 that the F-ratio for difference of mean gain scores of the different groups for cognitive ability is 39.08, which in comparison to the table value has been found significant at 0.01 level of significance. Hence, the hypothesis H₂: There exists significant difference in gain achievement scores of high, average and low group of cognitive ability, is accepted. The result indicates that the high, average and low cognitive ability groups do not yield equal level of achievement in English. To investigate further F-ratio is followed by t-test. The values of the t-ratio for different combination have been given in the table

Table-4.: t-ratio for different combinations of different cognitive ability groups on mean gain achievement scores

Variables	High Cognitive Ability N Mean SD	Average Cognitive Ability N Mean SD	Low Cognitive Ability N Mean SD
High Cognitive Ability	32 10.63 3.03	56 7.59 2.58	32 6.09 1.63
High Cognitive Ability			
N Mean SD	-	4.75**	7.44**
32 10.63			

2.64			
Average Cognitive Ability			
N Mean SD	--	--	3.33**
56 7.59 2.58			
Low Cognitive Ability			
N Mean SD	--	--	--
32 6.09 1.63			

** Significant at 0.01 level

Table-4 reveals that the mean gain score of high cognitive ability group is 10.63, which is higher than the corresponding mean gain score of 7.59 for average cognitive ability group. The t-ratio for difference in gain scores of high and average cognitive ability is 4.75, which in comparison to the table value ($t_{0.01}=2.63$, $df=86$) was found significant at 0.01 level of significance. Hence, the hypothesis of significant difference is accepted in case of high and average cognitive ability irrespective of grouping across other variables. The result indicates that high cognitive ability group of students perform significantly better than that of average cognitive ability group of students. Table-4 shows that the mean gain score of high cognitive ability group is 10.63, which is higher than the mean gain score of 6.09 for low cognitive ability group. The t-ratio for difference in gain scores of high and low cognitive ability group is 7.44, which in comparison to the table value ($t_{0.01}=2.66$, $df=62$) was found significant at 0.01 level of significance. Hence, the hypothesis of significant difference is accepted in case of high and low cognitive ability irrespective of grouping across other variables. The result indicates that high cognitive ability group of students perform significantly better than that of low cognitive ability group of students. Table-4 shows that the mean gain score of average cognitive ability group is 7.59, which is higher than the corresponding mean gain score of 6.09 for low cognitive ability group. The t-ratio for difference in gain scores of average and low cognitive ability group is 3.33, which in comparison to the table value ($t_{0.01}=2.63$, $df=86$) was not found significant even at 0.01 level of significance. Hence, the hypothesis of significant difference is accepted in case of average and low cognitive ability irrespective of grouping across other variables. The result indicates that the achievement of average and low cognitive ability group of students is significantly different in respect of gain scores.

Interaction between Online Mastery Learning Strategy and Cognitive Ability (A x B)

Table-2 reveals that the F-ratio for interaction between instructional strategy and cognitive ability is 5.86, which in comparison to the table value was found significant at 0.01 level of significance. It shows that the groups are different beyond the contribution of chance. Hence, the hypothesis H_3 : There exists significant interaction effect of instructional strategies and cognitive ability group is accepted. The result indicates that there is a significant difference in gain achievement scores in English due to interaction effect of computer assisted language learning and cognitive ability. To ascertain significance of difference among means of various

combination groups, t- ratios are calculated which have been shown in table-5.

Table-5: t-ratio for difference in mean gain achievement scores of instructional strategies and different levels of cognitive ability group

Variables	Experimental Group			Control Group		
	C1 M SD	C2 M SD	C3 M SD	C1 M SD	C2 M SD	C3 M SD
High Cognitive Ability	12.88 2.03	8.75 2.20	6.56 1.37	8.38 2.03	6.43 2.40	5.63 1.73
N Mean SD	--	6.26**	10.36**	6.25**	9.49**	10.82*
16 12.88 2.03						
Average Cognitive Ability	--	--	4.06**	0.56	3.74**	5.20**
N Mean SD						
28 8.75 2.20						
Low Cognitive Ability	--	--	--	2.98**	0.23	1.69
N Mean SD						
16 6.56 1.37						
High Cognitive Ability	-	--	--	--	2.87*	4.11**
N Mean SD						
16 8.38 2.03						
Average Cognitive Ability	-	--	--	--	--	1.27
N Mean SD						
28 6.43 2.40						
Low Cognitive Ability	-	--	--	-	-	-
N Mean SD						
16 5.63 1.73						

**Significant at 0.01 level

Note: Here C1 stands for High Cognitive Ability, C2 for Average Cognitive Ability and C3 for Low Cognitive Ability

Table-5 reveals that high cognitive ability group with mean of 12.88 of experimental group shows higher mean gain scores than average cognitive ability group with mean 8.75 of experimental group. The t-ratio for difference in mean gain scores of high and average cognitive ability of experimental group is 6.26, which in comparison to the table value ($t_{0.01}=2.71$, $df=42$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of experimental group exhibits higher mean gain scores than that of average cognitive ability of experimental group. Table-5 reveals that high cognitive ability group with mean of 12.88 of experimental group shows higher mean gain scores than low cognitive ability group with mean 6.56 of experimental group. The t-ratio for difference in mean gain scores of high and low cognitive

ability of experimental group is 10.36, which in comparison to the table value ($t_{0.01}=2.75$, $df=30$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of experimental group exhibits higher mean gain scores than that of low cognitive ability of experimental group. Table-5 shows that high cognitive ability group with mean of 12.88 of experimental group exhibits higher mean gain scores than that of high cognitive ability group with mean 8.38 of control group. The t-ratio for difference in mean gain scores of high cognitive ability of experimental and control group is 6.25, which in comparison to the table value ($t_{0.01}=2.75$, $df=30$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of experimental group possesses higher mean gain scores than that of high cognitive ability of control group. Table-5 indicates that high cognitive ability group with mean of 12.88 of experimental group exhibits higher mean gain scores than that of average cognitive ability group with mean 6.43 of control group. The t-ratio for difference in mean gain scores of high cognitive ability of experimental group and average cognitive ability of control group is 9.49, which in comparison to the table value ($t_{0.01}=2.71$, $df=42$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of experimental group possesses higher mean gain scores than that of average cognitive ability of control group. Table-5 reveals that high cognitive ability group with mean of 12.88 of experimental group possesses higher mean gain scores than that of low cognitive ability group with mean 5.63 of control group. The t-ratio for difference in mean gain scores of high cognitive ability of experimental group and low cognitive ability of control group is 10.82, which in comparison to the table value ($t_{0.01}=2.75$, $df=30$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of experimental group exhibits higher mean gain scores than that of low cognitive ability of control group. Table-5 shows that average cognitive ability group with mean of 8.75 of experimental group exhibits higher mean gain scores than that of low cognitive ability group with mean 6.56 of experimental group. The t-ratio for difference in mean gain scores of average and low cognitive ability of experimental group is 4.06, which in comparison to the table value ($t_{0.01}=2.71$, $df=42$) is found significant at 0.01 level of significance. Hence, the average cognitive ability of experimental group exhibits higher mean gain scores than that of low cognitive ability of experimental group. Table-5 shows that average cognitive ability group with mean of 8.75 of experimental group exhibits higher mean gain scores than that of average cognitive ability group with mean 6.43 of control group. The t-ratio for difference in mean gain scores of average cognitive ability of experimental group and average cognitive ability of control group is 3.74, which in comparison to the table value ($t_{0.01}=2.67$, $df=54$) is found significant at 0.01 level of significance. Hence, the average cognitive ability of experimental group exhibits higher mean gain scores than that of average cognitive ability of control group. Table-5 shows that average cognitive ability group with mean of 8.75 of experimental group exhibits higher mean gain scores than that of low cognitive ability group with mean 5.63 of control group. The t-ratio for difference in mean gain scores of average cognitive ability of experimental group and low cognitive ability of control group is 5.20, which in comparison to the table value ($t_{0.01}=2.71$, $df=42$) is found significant at 0.01 level of significance. Hence, the average cognitive ability of experimental group exhibits higher mean gain scores than that of low cognitive ability of control group. Table-5 indicates that

low cognitive ability group with mean of 6.56 of experimental group exhibits lower mean gain scores than that of high cognitive ability group with mean 8.38 of control group. The t-ratio for difference in mean gain scores of low cognitive ability of experimental group and high cognitive ability of control group is 2.98, which in comparison to the table value ($t_{0.01}=2.75$, $df=30$) is found significant at 0.01 level of significance. Hence, the low cognitive ability of experimental group exhibits lower mean gain scores than that of high cognitive ability of control group. Table-5 reveals that high cognitive ability group with mean of 8.38 of control group exhibits higher mean gain scores than that of average cognitive ability group with mean 6.43 of control group. The t-ratio for difference in mean gain scores of high and average cognitive ability of control group is 2.87, which in comparison to the table value ($t_{0.01}=2.71$, $df=42$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of control group possesses higher mean gain scores than that of average cognitive ability of control group. Table-5 reveals that high cognitive ability group with mean of 8.38 of control group exhibits higher mean gain scores than that of low cognitive ability group with mean 5.63 of control group. The t-ratio for difference in mean gain scores of high and low cognitive ability of control group is 4.11, which in comparison to the table value ($t_{0.01}=2.75$, $df=30$) is found significant at 0.01 level of significance. Hence, the high cognitive ability of control group possesses higher mean gain scores than that of low cognitive ability of control group. Table-5 reveals that rest of the combination of average cognitive ability of experimental with high cognitive ability of control group, low cognitive ability of experimental with average cognitive ability of control group and average with low cognitive ability of control group did not yield significant even at 0.05 level of significance.

Findings

The following conclusions were drawn which are described below such as:

- (1) The performance of group taught through online mastery learning strategy was found significantly higher than that of conventional teaching strategy with regards to achievement in English.
- (2) The performance of high cognitive ability group was found significantly higher than that of average and low cognitive ability group of students with regards to achievement. Further analysis revealed that:
 - (i) The mean gain achievement scores were not found significant for high and average cognitive ability group.
 - (ii) The mean gain achievement scores were found significantly higher for high and low cognitive ability group.
 - (iii) The mean gain achievement scores were found significantly higher for average and low cognitive ability group.
- (3) There was significant interaction effect of instructional strategies and cognitive ability on achievement in English. Further analysis revealed
 - (i) The high cognitive ability of experimental group possesses higher mean gain achievement score than that of average and low cognitive ability of experimental group.
 - (ii) The high cognitive ability of experimental group possesses higher mean gain achievement score

than that of high, average and low cognitive ability of control group.

- (iii) The average cognitive ability of experimental group exhibits higher mean gain achievement score than that of low cognitive ability of experimental group.
- (iv) The average cognitive ability of experimental group exhibits higher mean gain achievement score than that of high, average and low cognitive ability of control group.
- (v) The low cognitive ability of experimental group exhibits lower mean gain achievement score than that of high cognitive ability of control group but higher of average and low cognitive ability of control group.
- (vi) The high cognitive ability of control group possesses higher mean gain achievement score than that of average and low cognitive ability of control group.
- (vii) The average cognitive ability of control group possesses higher mean gain achievement score than that of low cognitive ability of control group.

Discussion

The available review of literature on the present study supports the idea that online mastery learning strategy is more effective than the conventional methods of teaching in English. The present study reveals that online mastery learning strategy is more effective than the conventional methods of teaching of English. Hence, the hypothesis H_1 is accepted. The results are supported by the finding of Sangwan [17] showed that Bloom's mastery learning strategy performed significantly better than program learning for increasing achievement motivation than programmed learning and conventional group. [18] concluded positive effects of mastery learning on achievement and self efficacy in English in relation to their entry behaviour. [19] concludes that mastery learning approach is an effective teaching method, which physics teachers should be encouraged to use and should be implemented in all teacher education programmes in Kenya. Sadeghi and Sadeghi (2012) [20] indicated that mastery learning promotes better quantitative results in English for surface learners. [21] concluded that mastery learning is a very effective method of teaching and better than the conventional teaching method and recommended that chemistry teachers should be encouraged to adopt it in order to enhance the cognitive learning outcome of students in quantitative chemistry. [22] indicated that the mastery learning strategy was more effective than traditional learning approach in enhancing students' knowledge acquisition. [23] found that Bloom's mastery learning approach was found more effective, successful and useful in teaching of English as compared to traditional learning approach at secondary level. [24] found that mastery learning strategy was found efficacious in engendering students' learning outcomes, it was recommended that Geography teachers should incorporate this teaching strategy during instruction so that learners would be guided to learn meaningfully and be assisted to retain content learnt in Geography. [25] suggested that the (LFM) learning for mastery strategy with an instructional time constraint has a positive impact on students' learning behaviour and contributes to better overall academic performance. [26] indicated that inquired on the effect of mastery learning approach in enhancing the academic achievement of mathematics and results exemplify that there

is a significant relationship between the students' attitudes toward mathematics and their academic achievement in mathematics. [27] found that there is a significant difference between the mastery learning and conventional instruction students' competence between the students has high and low cognitive entry behaviour. The findings are contradicted by the studies of [28]. [29] and Hutcheson [30] found that do not significant. For achievement in English with regards to cognitive ability, online mastery learning strategy is more effective on improving the cognitive ability than the conventional methods of teaching in English. Hence, the H_2 is accepted. The findings are supported by the studies of [31] found positive efficacy of mastery learning strategies on achievement in Economics in relation to cognitive styles. [32] found that technology assisted learning better supports vocabulary learning than face to face learning but is comparatively less effective in developing listening comprehension skills. [33] showed that a personalized computer assisted language learning system based on learner's cognitive ability related to foreign language proficiency helps students to learn English vocabulary effectively and enhances their foreign language skills. [34] study elucidated a suite of effective strategies to support advanced personalized learning via an intelligent adaptive tutor that can be tailored to the individual needs, emotions, cognitive states, and meta-cognitive skills of learners. [35] studied to identify self-regulation skills required for online learning and to characterize cognitive transfer of on-campus and online students. Study indicated that cognitive strategies and regulation of cognition are significant for successful online learning. Findings also indicated that the online students were more aware of mastery learning and information processing strategies than the on-campus peers. [36] results supported the incremental validity of non-cognitive factors. Achievement could be predicted by cognitive and background factors and by conscientiousness, self-efficacy and test anxiety. Moreover, the predictive power of variables varied across study programs, which suggests that research findings about the prediction of academic achievement might benefit from taking into account the specific program context. [37] showed that the SSCS + MS learning improved the creative thinking ability of the low academic student ability as much as 36.18% higher than that of the high academic students. The findings are contradicted by the studies of [38] indicate that students' self-directed learning abilities do not influence their learning outcomes The performance of various instructional strategy groups were found interacting with cognitive ability group. Hence, the hypothesis H_3 was accepted. The result is supported by the study of [39] found that online video tutorials increase learning of difficult concepts in an undergraduate analytical chemistry course. [40] indicated that performance of group taught through cooperative learning strategy does interact with meta-cognition. [41] concluded in his book that learning online provides a much-needed guide to different forms and applications of online learning. This book describes how online learning is being used in both K-12 and higher education settings as well as in learning outside of school. [42] indicated a statistically significant difference on the posttest when comparing the blended online setting and the traditional classroom setting, but no statistically significant difference based on a family's homeownership status and no significant interaction between the mode of instruction and parents' homeownership status. [35] indicated that cognitive strategies

and regulation of cognition are significant for successful online learning. Findings also indicated that the online students were more aware of mastery learning and information processing strategies than the on-campus peers. [43] discussed about the prominent assets of the English Language's enriching vocabulary sources and how it can be built to inspire students' international opportunities. The paper illustrated how the mind acts like an enemy for those youth who do not control it. The strength of the language does not come from physical capacity, but comes from indomitable willing consciousness. [27] found that there is a significant interaction effect between instructional model and cognitive entry behavior to the achievement of students' competence. The findings are contradicted by the studies of [44], [45] found that cooperative learning strategy do not interact self esteem with each other.

Conclusion

The present study reveals that achievement scores in English of students taught through online mastery learning strategy were more effective than that of conventional teaching strategy. Further, the gain mean with online mastery learning strategy group was higher in comparison to conventional teaching group and the difference across two methods of teaching was statistically significant. However, online mastery learning was found interacting with different intelligence groups in respect of gain scores. The study recommends the use of online mastery learning for better performance of students in English grammar at secondary stage. Thus, it can be concluded that online mastery learning strategy can play a pivotal role in enhancing the English language skills of the learners. It can be blended with conventional methods of teaching to enable the learners optimize their skills.

References

- [1]. M. Robinson, "Mastery Learning in Public Schools: Some Areas of Restructuring," *Education*, Vol. 113, no. 1, pp. 121-126.1992.
- [2]. J. Dewey, "Democracy and Education," New York: MacMillan Company.1916.
- [3]. K. Smith, "Becoming the 'Guide' on theSide,"*Educational Leadership*,Vol. 51, no.2, pp. 35-37. 1993.
- [4]. A. Brown, "Designing for Learning: What are the Essential Features of an Effective Online Course?" *Australian Journal of Educational Technology*, Vol. 13, no.2, pp. 115-126. 1997.
- [5]. K.L. Kelly and J. Schorger, "Online learning: Personalities, preferences and perceptions," 2002. Retrieved April 16,2019from<http://www.eric.ed.gov/ERICWebPortal/recordDetail%3Faccno%3DED470663>
- [6]. M. Anne and H.H. Christine, "Experimental Psychology (6th ed.)," New York: Wadsworth Publishing. 2005.
- [7]. C. Liu, "A Process-oriented e-learning System from Mastery Learning Perspective, Unpublished Ph. D. Thesis, Cheng Chi: University of Taiwan. 2005. Retrieved April 12, 2019fromnccur.lib.nccu.edu.tw/bitstream/140.119/.../1/C080520113819.pdf on
- [8]. H.C. Morrison, "The Practice of Teaching in the Secondary School," Chicago: The University of Chicago Press.1926.
- [9]. L.D. Crow and A. Crow, "Understanding our Behaviour," New York: Alfred. A.Knoff Publishers.1956.
- [10]. J. Atkinson, E. Berne, R.S. Woodworth, "Dictionary of psychology (4th ed.)," Delhi, India: Goyal Saab.1988.
- [11]. E.T. Megargee, "Encyclopedia of psychology, UK: Oxford University Press.2000.
- [12]. N. Chomsky, "Aspects of the Theory of Syntax," Cambridge, USA: Massachusetts Institute of Technology Press.1965.
- [13]. N. Dabbagh, A. Kitsantas, "Using Web-based Pedagogical Tools as Scaffolds for Self-Regulated Learning. *Instructional Science*, vol. 33, no.5, pp. 513-540. 2005.
- [14]. J. Moore and W. I. Kearsley, "Knowledge of Results of Self-teaching Spelling," *Psychological Reports*, vol. 9, pp.717-726. 2005.
- [15]. S.S. Jalota, "General mental ability test,"Agra: National Psychological Corporation.1972.
- [16]. R.L. Thorndike and E. Hagen, "Cognitive abilities test: Levels A to F (2nd ed.)," Windsor, England: NFER-Nelson.1986.
- [17]. R. Sangwan, "Effect of Mastery Learning Strategy on Pupils Achievement in Science, Their Self Concept Adjustment and Classroom Trust Behavior," Unpublished Ph. D. Thesis, Rohtak: MaharishiDyanand University.1992.RetrievedApril16,2019frommedu.earch.dauniv.ac.in/file.asp?ID=665.
- [18]. Vibha, Effect of Mastery Learning Strategies on Achievement and Self Efficacy in English in Relation to Entry Behaviour," Unpublished Ph. D. Thesis, Chandigarh: Panjab University.2001.
- [19]. P.W. Wambugu, and J.M. Changeiywo, "Effects of Mastery Learning Approach on Secondary School Student Physics Achievement," *Eurasia Journal of Mathematics, Science & Technology Education*, vol.4, no.3, pp. 293-302.2008.
- [20]. A. Sadeghi and A. Sadeghi, "Relevance of Mastery Learning in Teaching of English. *Creative Education*, vol. 3, no.1, pp. 41-44.2012.
- [21]. T.L. Mitee and G.N. Obaitan, "Effect of Mastery Learning on Senior Secondary School Students' Cognitive Learning Outcome in Quantitative Chemistry," *Journal of Education and Practice*, vol. 6, no. 5, pp. 34-38.2015.
- [22]. M.H. Amiruddin and F.L. Zainudin, "The Effects of a Mastery Learning Strategy on Knowledge Acquisition Among Aboriginal Students: An Experimental Approach," *International Journal of Vocational Education and Training Research*, vol. 1, no. 2, pp. 22-26.2015.
- [23]. I. Hussain and Q. Suleman, "Effect of Bloom's Mastery Learning Approach on Students' Academic Achievement in English at Secondary Level," *Journal of Literature, Language and Linguistic*, vol. 23, pp. 35-43. 2016.
- [24]. J. Filgona, J. Filgona and K.S. Linus, "Mastery Learning Strategy and Learning Retention: Effects on Senior Secondary School Students' Achievement in Physical Geography in Ganye Educational Zone,

- Nigeria. *Asian Research Journal of Arts & Social Sciences*, vol. 2, no. 3, pp. 1-14.2017.
- [25]. M.S. Ee, W. Yeoh, Y.L. Boo and T. Boulter, "Examining the Effect of Time Constraint on the Online Mastery Learning Approach Towards Improving Postgraduate Students' Achievement," *Studies in Higher Education*, vol.43, no. 2, pp. 217-233. 2018.
- [26]. T.M. Yemi, "Mastery Learning Approach: Its Effects on the Students Mathematics Academic Achievement," *European Journal of Education Studies*, vol. 3, no.1, 77-88. 2018
- [27]. I.K. Suandi, N.N. Aryaningsih and I.M. Abdi, "The Implementation of Mastery Learning Concept and Cognitive Entry Behavior to Increase the Students' Competency in Accordance with Iqf Qualification," *In Journal of Physics: Conference Series*, vol. 953, no. 1, p. 012094). IOP Publishing. 2018.
- [28]. G.H. Pezeshki, "The Effect of an Innovative Approach on Improving Mathematics Achievement of Maxican American Students Enrolled in College Algebra Classes," *Dissertation Abstracts International*, vol. 59, no.10, pp. 3721-A. 1998.
- [29]. S.Y. Mckenzie, "Achievement and Effective Domains of Algebra-I Students in Traditional or Self Paced Computer Programs," *Dissertation Abstracts International*, vol. 60, no. 9, pp. 3297-A.2000.
- [30]. P.J. Hutcheson, "The Effect of the Mastery Learning Approach on Student Motivation in Middle Level Science," *School of Education Student Capstone Theses and Dissertations*. 2015. Retrieved July 6, 2019 from https://digitalcommons.hamline.edu/hse_all/212
- [31]. S. Dutt and D. Kumar, "Mastery Learning Strategies- Their Effectiveness on Achievement in Economics in Relations to Cognitive Style," *Indian Educational Review*, vol. 45, no. 3, pp. 49-51. 2002.
- [32]. W. Hui, P.J.H. Hu, T.H.K. Clark, K.Y. Tam and J. Milton, "Technology Assisted Learning: A Longitudinal Field Study of Knowledge Category, Learning Effectiveness and Satisfaction in Language Learning," *Journal of Computer Assisted Learning*, vol. 24, no.3, pp. 245-259. 2008.
- [33]. S.Y. Jung, H.C. Kim, H.C., D.Y. Kwon, W. Lee, H.S. Lim and K. Nam, "A Personalized English Vocabulary Learning System Based on Cognitive Abilities Related to Foreign Language Proficiency," *Transactions on Internet and Information Systems*, vol. 4, no. 4, pp. 595-617. 2010.
- [34]. I. Arroyo, B.P. Woolf, W. Burelson, K. Muldner, D. Rai and M. Tai, "A Multimedia Adaptive Tutoring System for Mathematics that Addresses Cognition, Metacognition and Affect," *International Journal of Artificial Intelligence in Education*, vol. 24, no. 4, pp. 387-426. 2014.
- [35]. M. Barak, R. Hussein-Farraj and Y.J. Dori, "On-campus or Online: Examining Self-Regulation and Cognitive Transfer Skills in Different Learning Settings," *International Journal of Educational Technology in Higher Education*, vol.13, no.3. 2016 Retrieved June 17, 2019 from <https://doi.org/10.1186/s41239-016-0035-9>
- [36]. L. Fonteyne, W. Duyck and F. De-Fruyt, "Program-Specific Prediction of Academic Achievement on The Basis of Cognitive and Non-Cognitive Factors." *Learning and Individual Differences*, vol. 56, pp. 34-48.2017.
- [37]. Yusnaeni, A.D. Corebima, H. Susilo and S. Zubaidah, "Creative Thinking of Low Academic Student Undergoing Search Solve Create and Share Learning Integrated with MetaCognitiveStrategy," *International Journal of Instruction*, vol. 10, no. 2, pp. 245-262. 2017.
- [38]. P.N. Chou, "Effect of Students' Self- Directed Learning Abilities on Online Learning Outcomes: Two Exploratory Experiments in ElectronicEngineering," *Instructional Journal of Humanities and Social Science*, vol. 2, no. 6, pp. 172-179. 2012.
- [39]. Y. He, S. Swenson and N. Lents, "Online Video Tutorials Increase Learning of Difficult Concepts in an Undergraduate Analytical Chemistry Course," *Journal of Chemical Education*, vol., 89, no.1, pp.128- 1132. 2012.
- [40]. R. Mehar and S. Rai, "Effect of Collaborative Learning Strategy on Achievement in English in Relation to Meta-Cognition," *BCM Research Colloquium*, vol. 2, no. 2, pp. 8-13. 2014.
- [41]. B. Means, M. Bakia and R. Murphy, "What Research Tells Us About Whether, When and How. (1st ed.). New York. 2014. Retrieved June 14, 2019 from <https://doi.org/10.4324/9780203095959>.
- [42]. J. Hallam, "Blended Online Learning Versus Traditional Classroom Learning: A Comparison of Mathematics Content Mastery for High School Students of Homeowners and Non Homeowners. 2015. Retrieved June 14, 2019 from digitalcommons.liberty.edu.
- [43]. K. Khan, "Students English Language Learning as a Cognitive Function," *International Journal of Inspiration & Resilience Economy*, vol. 2, no. 2, pp. 31-33. 2018.
- [44]. K. Yilmaz, "The Cognitive Perspective on Learning: Its Theoretical Underpinnings and Implications for Classroom Practices," *The Clearing House*, vol. 84, no. 5, pp. 204-212. 2011.
- [45]. R. Mehar and A. Sekhri, "Effect of Cooperative Learning Strategy on Achievement in Mathematics in Relation to Self Esteem," *International Journal of Education and Research: New Frontiers in Education*, vol. 45, no. 4, pp. 63-69. 2012.