

## Liquid Crystal Display (LCD) based Instruction and Physics Performance

The study determined the effectiveness of Liquid Crystal Display (LCD) based instruction to academic performance of students in physics concept, physics problem solving and overall physics performance. Respondents were third year students enrolled in the Physics subject under the course Bachelor of Science in Agribusiness. Result showed that both students with and without LCD instruction based instruction have above average performance level on physics concept and overall performance and an average performance in physics problem solving aspect. Male and female respondents also have same physics performance level on concept aspect, problem solving aspect and overall physics performance for both with and without computer-aided instruction. Conduct of similar research is recommended to confirm result of the study.

**Keywords:** Liquid Crystal Display LCD, Physics Performance, Sex, Power point Presentation, Physics Concept, Problem Solving

### Introduction

There are various teaching techniques used by teachers in the teaching-learning process. Usually the technique used is based on the applicability and effectiveness of the technique or method to impart the necessary learning competency to the student. One of these techniques is the Liquid Crystal Display (LCD) based Instruction, specifically using the power point presentation. The integration of such type of instruction offers a wide opportunity to the educational system with its capacity to enhance and integrate wide and meaningful information. It also allows students to have access to concepts beyond the classroom setting. LCD based instruction could be used to maximize student's participation as well as their understanding on concepts presented to them. This tool may aid students in their learning process by enabling them to understand abstract concepts through visualization. Also, LCD based instruction could transform the teaching process by providing aid to teachers because of its ease of use, flexibility and interactivity.

LCD based instruction with using power point presentations has become part of many instructional settings and is an alternative tool for learning, particularly in large classes and in courses more geared toward information exchange. It has the potential to transform the learning process by providing a new learning culture with the use of interactive slides, abstracts concepts can be presented with the aid of visualization, videos and or music can also be incorporated in the lesson process. Power point presentation also opens up various opportunities for learning because it enables students to access, transform and share information. PowerPoint presentation with the aid of LCD can be a highly effective tool to aid learning. It allows teachers to explain abstract concepts, while accommodating all learning styles. This tool

1 may also serves as an avenue for collaborative learning and may enhance  
 2 student's critical thinking, creative thinking and problem solving skills. Used  
 3 properly, PowerPoint presentation can be one of the most powerful tools for  
 4 disseminating information, but if not used carefully, may disengage students  
 5 and hinder learning. It is in this concept that this study was formulated.

6 Objectives of the Study:

7 One of the teaching techniques used to impart a concept to students is  
 8 through LCD based instruction with the use of power point presentations. The  
 9 focus of the study was to compare the performance of students who were  
 10 taught of physics concepts with the use computer-aided instruction and  
 11 students using the conventional textbook or hand-outs. The study also intends  
 12 to compare the performance with the average. The following were the specific  
 13 objectives of the study:

- 14
- 15 1. To determine the level of students' concept and problem solving
- 16 performance in Physics without the LCD based instruction in the
- 17 learning process.
- 18 2. To determine the level of student's concept and problem solving
- 19 performance in selected topics on Physics with the use LCD based
- 20 instruction in the learning process.
- 21 3. To compare the physics performance level on concept aspect, problem
- 22 solving aspect and overall performance of students without computer-
- 23 aided instruction when grouped according to sex.
- 24 4. To compare the physics performance level on concept aspect, problem
- 25 solving aspect and overall performance of students with LCD based
- 26 instruction when grouped according to sex.
- 27 5. To compare the level of student's concept, problem solving and overall
- 28 performance in Physics with and without the use of LCD based
- 29 instruction in the learning process
- 30

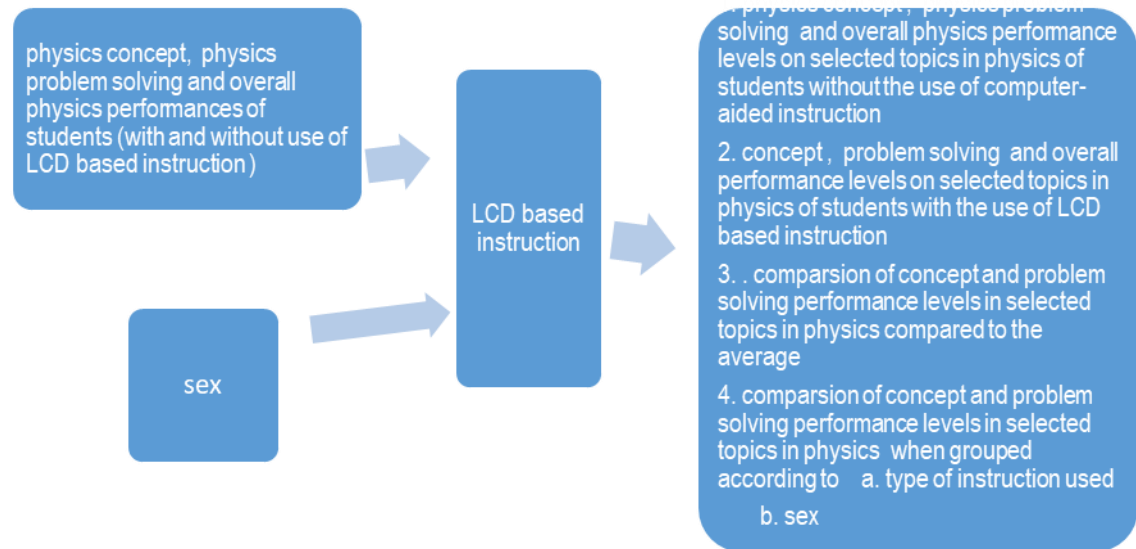
### 31 **Conceptual Framework**

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33 The teaching method used by instructors plays an important role in  
 34 knowledge and skill acquisition of students. Most classrooms from pre-primary  
 35 to tertiary institutions are dominated by the conventional method of teaching-  
 36 learning method using chalkboards, marker-boards and handouts. The study of  
 37 Aliyu (2003) showed that the conventional method was ineffectiveness for very  
 38 large group instruction. An inability to allow information storage for future  
 39 use; and accommodate illustrations to support the teaching was also observed.  
 40 The health hazard for teachers from chalk particles and it makes learning  
 41 uninteresting are among the other limitations of the lecture method.

42 The goal of the study was to know the effect of using LCD based  
 43 instruction specifically, power point presentation as a technique in the teaching  
 44 learning process of students in mathematics and physics. Figure 1 shows the  
 45 paradigm of the study:

46

1 *Figure 1. Paradigm of Study*2 **Input****Process****Output**

3

4

5 The independent variables were the students' concept and problem solving  
 6 performance on selected topics in Physics 11; and student sex. From the  
 7 independent variables, the concept and problem solving performance levels in  
 8 selected topics in Physics 11; the comparison of the performance in Physics 11  
 9 of students compared to the average and when grouped according to learning  
 10 using LCD based instruction and those with not.

11

### 12 **Hypotheses of the Study**

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- 15 1. The student's concept, problem solving and overall physics  
 16 performance level on selected topic in physics taught without using  
 17 LCD based instruction is on the average.
- 18 2. The student's concept, problem solving and overall physics  
 19 performance level on selected topic in physics taught with the use LCD  
 20 based instruction is on the average.
- 21 3. There is no significant differences in physics performance level on  
 22 concept aspect, problem solving aspect and overall performance of  
 23 students without LCD based instruction when grouped according to sex.
- 24 4. There is no significant differences in physics performance level on  
 25 concept aspect, problem solving aspect and overall performance of  
 26 students with LCD based instruction when grouped according to sex.
- 27 5. There is significant difference in the overall performance level in on  
 28 selected topic in Physics of students when grouped according to  
 29 learning with or without the use of LCD based instruction.

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## Literature Review

1  
2  
3 Different studies show that the use of technology in schools has developed  
4 new ways of teaching and learning. It enhances learning by providing a better  
5 understanding of the topic as well as motivating students.

6 According to Bartsch and Cobern (2003), various colleges and universities  
7 have rooms equipped with technology necessary for any instructor to display  
8 information via PowerPoint presentations. They also emphasized in their study  
9 that students believed that they learned more from PowerPoint lectures. It was  
10 also shown in a study that students like to be taught using PowerPoint  
11 presentations (Graig and Amernic, 2006).

12 Szabo and Hastings (2000) found to have positive attitudes toward  
13 PowerPoint lectures because they felt that PowerPoint lectures were  
14 interesting, able to get their attention, and help them to have better  
15 understanding. However, this did not reflect their achievement; both lecture  
16 styles had no significant differences on the students' test result.

17 Despite of the effectiveness of PowerPoint presentations to both teachers  
18 and students, they are one of the most easily misused teaching aids (Priya,  
19 2012). Greed (1997) argued about PowerPoint in several points: first, "You  
20 may get less feedback from the class because your eyes and theirs are on the  
21 screen rather than looking at each other;" second, students don't have a chance  
22 to synthesize what they've heard; and third, the emphasis is on the quality of  
23 your presentation rather than your students' learning.

24 Michael Fedisson and Silvia Braidic made a study on The Impact of  
25 PowerPoint Presentations on Student Achievement and Student Attitudes.  
26 During instruction one class was taught using conventional methods of book  
27 work, hand-outs and lecture, and using Power Point for a second class. Result  
28 of the study showed that when using power point with the aid of LCD, student  
29 test grades increased

30 F. Teofilo, et.al (2012) made a study on the Effect of Blended Learning on  
31 academic performance on problem solving and programming of Bachelor of  
32 Science in Information Technology students. Result of the study showed that  
33 students with blended learning perform significantly better .

34 Cladellas Pros, R. et.al (2013) studied the effects of the power point  
35 methodology on content learning. This study determined whether the use of  
36 PowerPoint technology as a method of transmitting information has an effect  
37 on students' learning compared with classes taught without this technology.  
38 The study included psychology students, divided into four groups, two of  
39 which were taught an ordinary Educational Psychology lesson with the only  
40 aid of the blackboard. while other two groups, a PowerPoint presentation was  
41 used to deliver the contents. Results showed significant differences with the  
42 scores of the groups without PowerPoint and the groups with PowerPoint. The  
43 use of technology can have a very positive influence on learning in a specific  
44 type of learning.

45 An examine was done by Bernardo E, et.al (2013) on the technology-  
46 driven teaching strategies used in Photojournalism course in Lyceum of the

1 Philippines University-Batangas. The study determined the frequency of use,  
2 the effectiveness and the problems encountered by the students during the  
3 execution of the technology-driven teaching strategies used. The results  
4 showed that the effectiveness of the technology-driven teaching strategies  
5 depends on how frequently they are used in the class, while effectiveness is not  
6 affected by the problems encountered.

7 Lari, F (2014) determined the impact of using Powerpoint presentations on  
8 students' learning and motivation in the secondary school English (TEFL)  
9 process. The subjects were split into two groups, (Experimental and Control).  
10 Each group was taught differently, one using technology like video-projector,  
11 power-point, in class; and the other through a traditional method such as the  
12 use of textbooks. Result showed teaching based on the use of technology had a  
13 significant positive effect on learners' scores. Analyses showed that the  
14 experimental group learners performed better than the control group.

15 Mark Angelo S. Enriquez (2014) made a study on students' Perceptions on  
16 the Effectiveness of the Use of Edmodo as a Supplementary Tool for learning  
17 social science courses. The findings affirmed that majority of participants  
18 considered Edmodo as an effective supplementary tool for their learning.

19 Balmeo, etal (2014) made a study on integrating technology in teaching  
20 students with special learning needs in the SPED Schools in Baguio City. The  
21 research focused on integration of technologies in the educational  
22 environments where students with special learning needs are housed. It  
23 determined the availability and effectiveness of technology in the classroom  
24 and determined encountered problems in the technology integration. Result  
25 showed that there were limited level of availability and effectiveness of  
26 technology.

27 Aquino (1986) as cited by Calisog (2010), and Teofilo (2012) said that  
28 teaching is the act of providing activities that facilitates learning. It is the  
29 process where gaining knowledge and learning takes place. There are many  
30 techniques or methods used in the teaching-learning process by teachers. The  
31 technique or method used is usually based on the applicability and  
32 effectiveness of the technique or method to impart the necessary knowledge to  
33 the student. Computer-aided instruction like PowerPoint using Liquid Crystal  
34 Display (LCD) has become part of many instructional settings and is an  
35 alternative tool for learning, particularly in large classes and in courses more  
36 geared toward information exchange. PowerPoint can be a highly effective  
37 tool to aid learning. PowerPoint can be one of the most powerful tools for  
38 disseminating information, but if not used carefully, may disengage students  
39 and hinder learning. PowerPoint could potentially confuse students and make  
40 learning a difficult process. It is in this concept that this study was formulated.

41 Based on the result of the study of Tagle (2007), lecture was the most  
42 utilized instructional method in teaching by the teachers. Demonstration and  
43 problem solving methods are the other methods commonly used. Benguet State  
44 University is among schools which makes use of lecture method. Hence, it is  
45 necessary to consider if the use of other techniques like Liquid Crystal Display

1 (LCD) based instruction will make a significant improvement on students'  
2 academic performances.

### 3 4 **Significance of the Study**

5  
6 It was hoped that the output of this study would show the technology  
7 effect to physics performance level of students. The result of the study would  
8 provide relevant information to the faculty of the College about the learner to  
9 help the teacher select appropriate strategies, methodologies and the type of  
10 instructional materials to be used that would arouse the intellect of the students.  
11 It is also hoped that the results of this study could contribute to the research  
12 literature in the field of education in general and the improvement of physics  
13 instruction in particular.

## 14 15 16 **Methodology**

### 17 18 **Respondent and Place of Study**

19  
20 The respondents of the study were students enrolled in selected physics  
21 subject under one of the researcher's classes, during the first and second  
22 semesters of the school year 2016-2017 at Benguet State University, La  
23 Trinidad, Benguet.

24 The researchers utilized complete enumeration on each class. Specifically,  
25 two Bachelor of Science in AgriBusiness classes were the respondents three  
26 males and twenty four females in the experimental group while there were four  
27 males and thirty two females in the control group.

### 28 29 **Research Method**

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31 The study is a descriptive causal quantitative research which makes use of  
32 purposive sampling technique.

### 33 34 **Instrumentation**

35  
36 Student were taught of Physics concept on Mechanics using power point  
37 presentation with the aid of LCD for one group and another group of students  
38 were taught of the same concept using the conventional method of instruction.  
39 To avoid other possible intervening factors, two classes of the same year level  
40 and same course and subject of each researcher were utilized. A respondent  
41 homogeneity test was also conducted and affirmed homogeneity of respondents. A  
42 teacher-made exam was given to the students before the conduct of the study to  
43 randomize the proper distribution of students according to group. Each group  
44 was divided into groups as experimental or control group. The same formulated  
45 test was given to the two groups to measure the corresponding performance.  
46 Comparison of performance for the two groups was done.

1 **Statistical Analysis**

2

3 The performance in Physics were grouped into two categories: the concept  
4 category and the problem solving category.

5 The mean was used to determine the categorized performance level of in  
6 physics of students with the following scale:

7

8	93 or Above	High Performance	H	
9	84 – 92	Above Average	Performance	AA
10				
11	75 – 83	Average Performance		A
12				
13	66 – 74	Below Average	Performance	BA
14	65 or below	Poor	Performance	P

15

16 The t-test was used to compare the performances of the students taught  
17 using computer-aided instruction and with the control group. One-Sample t test  
18 was used to compare level of performance compared to the average. All tests  
19 were done at 0.05 level of significance.

20

21

## Results and Discussion

### Level of Performance of Students in Physics without the LCD based Instruction

Table 1 presents the level of physics performance of students who did not use the LCD based Instruction. Analysis showed that the level of performance of students in concept was above average with a mean of 84.85. Specifically, 57.50% of the respondents had either high or above average performance in physics concept, while 42.5% either average or below average performance in physics. On the other hand, the level of performance of students in problem solving was average as presented by the mean of 81.99. Among the students, 45.50% of the students have average performance while the 30.30% have either above average or high performance level and the remaining 8% performed either below average or poor.

Table 1. Level of performance of students without the use of LCD based Instruction

Level	f	%	Mean	D.E.	p-value
<u>Concept</u>					
High	1	3.00	84.85	AA	0.000**
Above Average	18	54.50			
Average	9	27.30			
Below Average	5	15.20			
<u>Problem Solving</u>					
High	4	12.10	81.99	A	0.063 <sup>ns</sup>
Above Average	6	18.20			
Average	15	45.50			
Below Average	7	21.20			
Poor	1	3.00			
<u>Over – All</u>					
Above Average	16	48.50	83.56	A	0.000**
Average	17	51.50			
Total	58	100.00			

Overall, the performance of the students was average with a mean value of 83.56. However, analysis revealed that the level of performance of students who did not use LCD based Instruction is significantly different from average with a p-value of 0.000. Thus, the hypothesis is rejected. This simply suggests that the level of performance of students who did not use Computer-Aided Instruction is higher than average. Result show that 51.50% of the respondents had average performance while 48.50% have above average performance but the variance in performance level in the concept and in problem solving lead to a mean that is significantly higher than the average. This indicates that the traditional method of teaching learning process is still effective method in the transfer of knowledge to students. This is both true for concept aspect and problem solving aspect in physics.



1 **Level of Performance of Students in Physics with the Use of LCD based**  
 2 **Instruction**

3  
 4 Table 2 presents the performance level in physics of students who  
 5 undergone the learning process in physics with the use of LCD based  
 6 instruction. Using the Likert scale, the computed mean values of 82.36%,  
 7 81.78% and 82.10% for concept aspect, problem solving aspect, and overall  
 8 performance, respectively, implies all performance level are on the average.  
 9 However, further comparison to the average at 0.05 level of significance, and  
 10 presented by the p values of 0.002, .0099, and .006, respectively for concept  
 11 component, problem solving component, and overall performance, the concept  
 12 and overall performance is above average while the problem solving aspect  
 13 performance is on the average.

14  
 15 *Table 2.* Level of performance of students without the use of LCD Aided  
 16 Instruction

Area	f	%	Mean	D.E.	p-value
<u>Concept</u>					
Above Average	11	44.00	82.36	A	0.002**
Average	12	48.00			
Below Average	2	8.00			
<u>Problem Solving</u>					
High	2	8.00	81.78	A	0.099 <sup>ns</sup>
Above Average	6	24.00			
Average	12	48.00			
Below Average	5	20.00			
<u>Over – All</u>					
Above Average	11	44.00	82.10	A	0.006**
Average	13	52.00			
Below Average	1	4.00			
Total	58	100.00			

17  
 18 The result indicates that computer-aided instruction is likewise an effective  
 19 method to be used in the teaching learning process not on just on the impart of  
 20 concept but also in the problem solving aspect.

21 The result from table 2 shows a similar result with students who did not  
 22 used the computer aided instruction as presented in table 1. This implies that in  
 23 imparting knowledge be it concept or problem solving aspect, the traditional  
 24 way and LCD based instruction are both effective. This result is supported by  
 25 the study of Daniels (1999) which showed the effectiveness of computer-aided  
 26 instruction in a tertiary level economics class and found no significant  
 27 difference in student performance showed that there was no evidence that  
 28 PowerPoint can enhance students' performance.

29  
 30

## 1 **Difference on the Performance of Students when Compared According to** 2 **Sex**

3  
4 Table 3 presents the comparison of performance level in physics without  
5 the use LCD based Instruction when students are grouped according to sex.  
6 The computed mean values gave difference in performance level along concept  
7 and overall performance for male and female. While on problem solving  
8 aspect, both male and female have above average performance level. Further  
9 testing though, showed p values which were not significant at 0.05 level of  
10 significance. This implies that there were no significant differences on the level  
11 of performance along concept, problem solving and on the overall of male and  
12 female students who did not use LCD based Instruction. Hypothesis is  
13 therefore rejected.

14  
15 *Table 3.* Level of performance of students without the use of LCD based  
16 Instruction when compared according to sex

AREAS	Male		Female		p-value
	Mean	D.E.	Mean	D.E.	
Concept	89.17	AA	83.00	A	0.055 <sup>ns</sup>
Problem Solving	89.39	AA	84.39	AA	0.111 <sup>ns</sup>
Over-All	85.19	AA	81.67	A	0.522 <sup>ns</sup>

17  
18 Table 4 shows the comparison of performance level on physics along  
19 concept, problem solving and on the overall with LCD Based Instruction when  
20 students were grouped according to sex. As indicated by the computed mean  
21 values which were categorized as average performances based on the Likert  
22 scale used, the performance level along concept, problem solving and on the  
23 overall performance of both male and female are on the average. Further  
24 testing as presented by the p values computed confirms that the performance  
25 level in physics are not significant when grouped according to sex.

26  
27 *Table 4.* Level of performance of students with the use of LCD Based  
28 Instruction when compared according to sex

AREAS	Male		Female		p-value
	Mean	D.E.	Mean	D.E.	
Concept	81.82	A	82.44	A	0.655 <sup>ns</sup>
Problem Solving	83.33	A	81.57	A	0.839 <sup>ns</sup>
Over-All	80.83	A	82.27	A	0.731 <sup>ns</sup>

## 29 30 **Difference on the Physics Performance of Students when Compared** 31 **According to Method used**

32  
33 Table 5 presents the comparison of physics performance level on concept  
34 and problem solving aspect of students grouped according to method used in  
35 the teaching learning process. Based from the computed p values which were  
36 not significant at 0.05 level of significance, there were no significant  
37 differences on the level of performances of student in physics when compared

1 according to the teaching method used. This simply suggests that students who  
 2 used LCD Based Instruction have the same performance level with students  
 3 who did not use LCD Based Instruction.

4

5 *Table 5.* Level of physics performance of students when compared according to  
 6 method

AREAS	Without LCD Based Instruction		With LCD Based Instruction		P-value
	Mean	D.E.	Mean	D.E.	
Concept	84.85	AA**	82.36	A**	0.297 <sup>ns</sup>
Problem Solving	81.99	A <sup>ns</sup>	81.78	A <sup>ns</sup>	0.067 <sup>ns</sup>
Over-All	83.56	A**	82.10	A**	0.927 <sup>ns</sup>

7

8 For students who did not used computer aided instruction, table 1 showed  
 9 that the performance level on concept and overall physics performance are  
 10 above average while average performance level is observed on the problem  
 11 solving aspect. Same result is presented on table 2 showing the same  
 12 performance levels on the concept, problem solving and overall performance  
 13 for students with LCD based Instruction. Table 5 confirms the said similar  
 14 results and indicated that indeed, students both with or without LCD based  
 15 instruction have above average overall physics performance level and on the  
 16 concept aspect. Average performance level are observed on the problem  
 17 solving aspect for both group. This confirms that the conventional and LCD  
 18 based instruction are both effective teaching method in imparting physics  
 19 knowledge. Similar result was shown by the study of Fedisson, F and S.  
 20 Braidic on 2<sup>nd</sup> level student achievement. Incorporating LCD-aided instruction  
 21 does not show significant difference in the performance level with those who  
 22 utilized the conventional method of text book and chalk board way of teaching.  
 23 Study of Balmeo likewise showed similar result. Similarly, Savoy et al. (2009),  
 24 Apperson et al. (2006); Bartsch and Cobern (2003); Beets and Lobingier  
 25 (2001) Susskind (2005); and Szabo and Hastings (2000) found little effects of  
 26 PowerPoint on students' academic achievement. More than the traditional  
 27 lectures.

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### Conclusion

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Based on the result of the study, the following are concluded:

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1. The performance level in the problem solving aspect of physics is average, while the performance level on the concept and also overall physics performance level are both above average for student not using LCD based instruction.
2. The performance level in the problem solving aspect of physics is average, while the performance level on the concept and also overall

- 1 physics performance level are both above average for student using  
 2 LCD based instruction.
- 3 3. The physics performance level on concept, problem solving aspect and  
 4 overall performance of both female and male students who had no LCD  
 5 based instruction, do not differ significantly.
- 6 4. The physics performance level on concept, problem solving aspect and  
 7 overall performance of both female and male students who had LCD  
 8 based instruction, do not differ significantly.
- 9 5. Students' physics performance level on the concept aspect, problem  
 10 solving aspect and overall performance do not differ significantly when  
 11 grouped according to method of instruction used.

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