

## Implications of Visual Complaints on Student Learning Achievement

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### ABSTRACT

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This research studies the effect of visual complaints on learning achievement. Visual complaints are such as headaches, objects that appear double, tired eyes, watery eyes, dry eyes, etc. High and low visual complaints are strongly influenced by the mobility of the students or their motor activities. Mobility has certain roles in maintaining students' concentration at a certain time. Students' classroom mobility is generally carried out through simple interactive learning, an effort to invite students to move and be active during the learning process. The current research is a part of a long-term undertaking on investigating effective learning strategies in vocational universities. It currently focuses on identifying suitable teaching-learning methods that can provide optimum results on students' academic achievement, especially in English as a subject. Keeping in view that the students' concentration decreases along with (1) the length of the lecture, and (2) the lack of students' classroom interaction. Consequently, the current study develops a strategy in increasing the students' classroom mobility and attempted to test the impact of that strategy in maintaining the students' concentration during the lecture. An experiment was conducted using two-period crosses over design to find out the effect of the intervention on subjects' condition. Assessment on the quality of the learning process was carried out through 2 cycles of study, in which each cycle was concluded with a test. Data were analyzed descriptively. While calculating the final grades, weight was assigned to all the parameters i.e. daily test (10%) + assignment (10%) + report (10%) + Middle Semester Exam (30%) + Final Semester Examination (40%). The results indicated that high visual complaints can reduce concentration and reduce student achievement.

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## **INTRODUCTION**

Visual complaint plays an important role in the learning process. Without visual function (i.e. ability to see), learning becomes certainly low (Wahyudin & Sutikno, 2010). It is even more crucial in English learning. Students who experience serious visual complaints will find difficulty in completing the task assigned by the lecturer. It is difficult to imagine if a student who gets the material "conversation" can do the tasks assigned by the lecturer.

Some have recognized that visual complaints correlate with students' concentration. Wahyudin & Sutikno (2010); Suprpta (2012) state that in understanding lecture material, students face several technical problems related to poor quality of the learning process, which includes: 1. use of learning facilities or media; 2. learning steps; 3. student interaction; 4. use of study time; 5. utilizing learning potential; 6. use of teaching materials/materials and 7. content relevance to the context and real work. These factors have a close relationship with learning's absorption and mastery and have implications for the level of learning achievement that can be achieved by students. Other source also indicates that the ability of lecturers to provide lecture materials also greatly influences the success of the learning process (Soemarto, 2005; Widiatmoko, 2012).

Students responses to the implementation of learning consist of components, including: (1). Conformity in implementing lectures with lesson plans (plan for implementing learning); (2) Punctuality of lecturers for lecture; (3) The ability of lecturers in presenting lecture material; (4) The ability of lecturers to motivate students; (5) Lecturers' improvisational abilities; (6) Lecturer and student interactions; (7) Test suitability with lecture material; (8) Lecturer services to students; (9) Use of teaching aids by lecturers and (10) Mastery of material by lecturers). The important determining factor is the level of student satisfaction with facilities and the use of institutional resources (Brahmasari & Suprayetno, 2008; Parasuraman, Zeithaml, & Berry, 1988).

One of the causes of students' difficulties in understanding English material is the learning strategy that is still conventional, one-way and monotonous. Teaching strategies are one of the factors that determine the quality of the learning process and the learning outcomes of a course (Suryawati, 2004; Panudju, 2003). Various strategies have been introduced and practiced to improve the quality of teaching, but strategies which are proven efficacious are scarce. There are various constraints in improving the quality of education even though the implementation of new methods is the reluctance of educators to implement the strategies offered, because of the limited facilities and infrastructure (Kurniawan & Istiningrum, 2012; Effendi, 2012). With the rapid development of technology, limited facilities are not a problem anymore, only need is to create and implement an accurate strategy so that educators can prepare the teaching and learning process well and learners optimally benefitted (Ali, 2009; Indiyani, 2006). The most important strategy is to determine the duration to get a minimal level of visual complaints.

According to Bali State Polytechnic Strategic Plan (2009-2014), there are several performance indicators that must be achieved in the short term. The GPA (Cumulative Achievement Index) which was scored 3.6 at the end of 2014 only reached 3.43. There is a pressing need for an effort to improve students' GPA in the future (Anonymous, 2015; Widana, 2018). Similarly, continuous effort is also in need to increase the students' level of satisfaction. This increase can be a stepping stone in filling the gap between students' expectations and perceptions. To achieve these two

objectives, the researchers have worked towards getting a suitable duration for optimal achievement.

The research was conducted in Mechanical Engineering Study Program of the Bali State Polytechnic. Sufficient number of samples was deemed as representative of Bali State Polytechnic students as the target population.

## **METHODS**

The current study is an experimental study, conducted at the Mechanical Engineering Study Program of Bali State Polytechnic. The research subjects were 2<sup>nd</sup> semester students of English courses in the study program. The second-semester students consisted of three classes, each class had 32 students. From the total three classes, only two classes were involved in the study. Hence, the total students involved was 64.

To find out the effect of the intervention on the subject, an experiment was conducted using the two period cross over design. This crossing design has an advantage of controlling biological variables between subjects, and the sample is needed only half of the number of parallel design samples (Bakta, 2000; Steven, 2005; Bose & Dey, 2009). The assessment of the quality of the learning process was carried out with 2 cycles of study, in which each cycle was concluded through giving a questionnaire. The strategy adopted was: increased student mobility in the class by giving more active roles, including presenter roles from students, the appointment of questions by students, which were answered by other students. The technique of participant class action research was used for implementing. Classroom action research is an integral component of learning which included the following stages: 1. Planning; 2. Implementation of action; 3. Observation of learning activities and evaluation of processes and learning outcomes (observation and evaluation), and 4. Reflection of the process and results of learning (reflection).

Data on students' satisfaction of the learning process was collected through direct observation of student activities in the class using a questionnaire. Each variable was assessed using a 5 level Likert scale having scored from 1-5, very good with a score of 5, good with a score of 4, good enough with a score of 3, bad with a score of 2 and very bad with a score of 1 (Bose & Dey, 2009). The average score of each student was calculated. The final results were analyzed descriptively. Student learning achievements in the form of final grades were calculated by weight given: 10% daily test + 10% assignment + 10% report + 30% semester middle exam + 40% semester final exam.

Data obtained on P0 (before interventions) and P1 (after interventions) were then analyzed using SPSS 15.0 for Windows application. Descriptive analysis of the data was done using mean, standard deviation and range. Test for normality was also conducted. Data for each period of concentration and learning achievement were analyzed by the normality test, Shapiro-Wilk test at the significance level of 5% ( $\alpha = 0.05$ ). Test for comparability was also administered to find out the influence of environmental conditions on sample before and after the intervention (application of student mobility methods in the classroom). The comparison was done between the results of period 1 observations with period 2 which included environmental conditions in the form of mean wet temperature, dry temperature, air humidity, wind speed and light intensity.

Wherever the data were normally distributed, parametric statistical test, 'Two Pair Sample T-test' was applied and wherever the data was not normally distributed with a p-value of  $<0.05$ , Non Parametric test 'Wilcoxon Signed Rank Test' different test at the significance level of 5% ( $\alpha = 0.05$ ) was applied Similarly visual complaints data, concentration and learning achievement have been processed using the same reference. In the statistical hypothesis and the Decision rule, examples of learning achievement data were used. Statistical hypothesis for learning achievement data.

Ho:  $\mu_1 = \mu_2$  average learning achievement before the application of a simple interactive method, the same as the average learning achievement after the application of a simple interactive learning method.

Ha:  $\mu_1 < \mu_2$  average learning achievement before the application of a simple interactive method, smaller than the average learning achievement after the application of a simple interactive learning method.

Decision rule. H0 accepted that there was no significant difference between the average learning achievement before the application of a simple interactive learning method, with the average learning achievement after the application of a simple interactive learning method. H0 rejected, there was a significant difference between the mean of learning achievement before the application of simple interactive learning methods with the average learning achievement after the application of a simple interactive learning method.

## RESULTS AND DISCUSSION

Characteristics of the subject, age averages, standard deviation and ranges are presented in Table 1.

	No.	Description	Average	Standard of Deviation	Range
Group = A	1	Age (years)	19.22	0.73	18 – 20
Group = B	2	Age (years)	19.43	0.71	18 – 20

Table: 1 Characteristic of Subjects

In the A class group, the average age of students who were subjected was  $19.22 \pm 0.73$  years, with a range of 18 to 20 years. The B class group is also in the range of 18-20 years, with an average age of  $19.43 \pm 0.71$  years. Both data are not significantly different with  $p > 0.05$ . This would justify the conclusion that the results of the intervention were not biased due to the initial differences in the subject's condition.

The results of the normality test on data on environmental conditions, both for the conditions of the learning environment in groups A and B in period 1 and period 2 indicate that the data are normally distributed, namely light intensity data, while the dry temperature data, wet temperature, relative humidity, wind speed and noise are not normally distributed. If one of the data is not normal, a non-parametric test is used. Thus, the data were tested by the Mann-Whitney test. The results of data analysis of environmental conditions in the class can be seen in Table 2.

No.	Environmental Indicators	Average			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2
1	Dry temperature (° Celsius)	25.00	26.21	26.00	25.21
2	Wet temperature (° Celsius)	22.02	22.12	23.00	21.11
3	Relative humidity (%)	71.04	72.01	70.80	71.00
4	Wind speed (m/min)	0.20	0.10	0.10	0.10
5	Noise (decibel)	74.00	72.00	71.00	71.10
6	Lux intensity (lux)	278.20	287.00	273.60	277.00

Description: m/min = meter/minute; per = period

Table 2: Environmental Conditions

The average dry temperature in group A in period 1 is 25.00 Celsius and period 2 is 26.21 Celsius, while in group B class 1 period is 26.00 Celsius and period 2 is 25.21 Celsius. Period 1 and period 2 data in group A did not differ significantly, neither did the data in group B. The status did not differ significantly in the data on wet temperature, relative humidity, wind speed, noise and light intensity between period 1 and period 2, both class A and B groups. This indicates that environmental conditions had no effect on the outcome of the intervention. This will reinforce the conclusion that the results of the intervention are not biased due to differences in environmental conditions.

By observing several major indicators indicating level of visual complaints, such as headaches, objects that appear double, tired eyes, watery eyes, dry eyes, eye of patch, blurred vision and the occurrence of reading errors, the calculation results are presented in Table 3 below.

No.	Visual Indicators	Average			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2
1	Pain on the Head or headache	108	104	101	107
2	Double Visible Objects	78	78	75	82
3	Tight Eyes	73	73	69	76
4	Wet Eyes	54	54	52	55
5	Dry Eyes	61	61	59	60
6	Eye of Patch	76	76	71	77
7	Views of Blur	92	72	75	91
8	Error of Reading	98	88	90	97
	Total score =	640	606	592	645

Table 3: Indicators of Visual Complaints

Group A subjects observed in the first period without giving treatment, had visual complaints load score of 640 and experienced improvement in period 2 to 606. In period 2 the subjects were treated in the form of interactive tasks that caused students to increase mobility.

Based on the Bourdon Wiersma test calculations using quantitative interpretation calculations, the results are presented in the following Table 4:

No.	Concentration Indicators	Average			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2

1	Speed (minutes)	10.81	09.39	09.22	10.79
2	Accuracy (times)	05.08	02.71	02.73	05.04
3	Constanction (minutes)	02.99	02.24	02.21	02.87

Table 4: Concentration Indicators

Group A subjects were observed in the first period of concentration, where the subject had not been given treatment, the speed of completing the task was 10.81 minutes and experienced improvement after the treatment in period 2 to 09.39 minutes or increased by 13.14%.

Accuracy in group A period 1 was calculated based on the number of items where the subject made mistakes with the help of Bourdon Wiersma test. The more mistakes the subject made it was assumed to less thorough. It was found that in group A period 1 the subjects made an error 5.08 times. After being given treatment in period 2, the subject experienced a performance increase of 46.65% with an error rate of 2.71 times. Other concentration indicators, namely constancy also improved by 25.08% in period 2.

To get a clearer picture, the conversion value from the quantitative data interpretation can be observed in Table 5 below.

No.	Concentration Indicators	Value			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2
1	Speed (minutes)	08.00	09.00	09.00	08.00
2	Accuracy (times)	07.00	08.00	08.00	07.00
3	Constanction (minutes)	08.00	08.50	08.50	08.00

Table 5: Value Conversion in Quantitative Interpretations

From Table 5, it can be observed that the speed of the subject has increased from 8 to 9, as well as the indicator of accuracy has increased from number 7 to 8. The constant has increased from 8 to 8.5. Conversely, in group B, where subjects were given treatment in period 1, the value of the indicator of speed, accuracy and constancy experienced the same thing.

No.	Concentration Indicators	Weighted Scores (WS)			
		Group A		Group B	
		Period-1	Period- 2	Period-1	Period-2
1	Speed (minutes)	12.00	14.00	14.00	12.00
2	Accuracy (times)	-	13.00	12.00	-
3	Constanction (minutes)	12.00	13.00	13.00	12.00

Table 6: Weighted Scores (WS) Conversions in Quantitative Interpretations

Table 6 conversion in the Weighted Score (WS) also shows the results. The WS value in period 1 in subject A group was 12 and rose significantly to 14 in period 2. The WS value in the accuracy indicator was not detected in group A data in period 1, while in period 2 it was at level 13. The WS value in the indicator the constancy increases by 7.7% from period 1 to period 2, that is, from the value of WS 12 to 13. As the value is in the data group A, similar is visible in group B.

No.	Concentration Indicators	Group			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2

1	Speed (minutes)	ETG	Good	Good	ETG
2	Accuracy (times)	Enough	ETG	ETG	Enough
3	Constancy (minutes)	ETG	ETG	ETG	ETG

Description: ETG = Enough to Good

Table 7: Group Conversions in Quantitative Interpretations

The next data which is also an indicator of concentration is a group. The subject of group A which observed the speed in period 1 showed that the data was in an enough to good (ETG) and increased significantly to Good in period 2. Accuracy data also increased, that is, from being enough to ETG. What is unique is the data constancy, where from period 1 to period 2 there is no change, it remained the same.

No	Component of Assessment	Average of Value			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2
1	Quiz 1	71	89	91	72
2	Quiz 2	72	79	85	74
3	Task 1	70	89	85	70
4	Task 2	73	82	88	70
5	Reports	69	91	90	72
6	Midterm	74		89	
7	End of semester exams		88		75
	Average	72	86	88	72

Table 8: Student Learning Achievement Assessment

The learning achievement of group A student in period 1 was an average of 72 and increased by 16.28% to 86 in period 2. As previously explained, this increase in achievement was due to the intervention given in the learning process. The process in question is teaching materials and teaching methods. In contrast, in group B, the intervention was given in period 1. The results of learning achievement in period 1 showed better compared to period 2. For quiz 1, the results of the average test were 91 in period 1 and dropped dramatically by 20.88% to 72. These results at the same time justify some of the results of research that say that teaching materials and teaching methods have a significant influence on learning outcomes (Bisri, Samsudi, & Suprpto, 2009; Riyanto, 2001; Widana & Sudiartha, 2017).

No.	Component of Assessment	Satisfaction Score			
		Group A		Group B	
		Period-1	Period-2	Period-1	Period-2
1	Tangibles	3,91	4,25	4,12	3,12
2	Reliability	3,70	4,01	4,16	3,14
3	Responsiveness	3,51	4,12	4,82	3,21
4	Assurance	3,23	4,13	3,96	3,12
5	Empathy	3,36	3,92	4,12	4,01
	Average	3,54	4,09	4,24	3,32

Table 9: Student Satisfaction Assessment

Student satisfaction is closely related to the availability of facilities and appropriate learning methods (Nurani, 2003; Syairuddin, Patdono, & Suartika 2007; Widana & Sudiartha, 2018). For satisfaction related to facilities, student perceptions have increased from period 1 to period 2. In

period 1 in group A, the value of tangibles is at 3.91. After the intervention, there was a change in the value in period 2, with a score of 4.25, or an increase of 8%. The same changes also occurred in other aspects. In the reliability aspect (the ability to deliver material) and the responsiveness aspects (responsibilities) also increased by 7.73% and 14.81% respectively. Likewise, aspects of assurance (guarantee of process quality) and empathy (heart-to-heart/family approach) increased by 21.79% and 14.29% respectively.

## CONCLUSION

Based on the discussion in the previous chapter, we can conclude that firstly, visual complaints have a bad influence on concentration and student achievement. Then, learning methods that lead to increased student mobility (supported by multimedia facilities) also appear to increase students' satisfaction. This is shown by the perceptions of students who provide an assessment on aspects of tangibles, reliability, responsiveness, assurance and empathy. The increase in achievement and satisfaction is as follows. The learning achievement of group A student in period 1 was at an average of 72 and increased by 16.28% to 86 in period 2. As previously explained, this increase in achievement was due to the intervention given in the learning process. The process in question was teaching materials and teaching methods. In contrast, in group B, the intervention was given in period 1. The results of learning achievement in period 1 appeared to be better in comparison with period 2. For quiz 1, the results of the average test were 91 in period 1 and dropped dramatically by 20.88% to 72. Student satisfaction is closely related to the availability of facilities and appropriate learning methods. For satisfaction related to facilities, students' perceptions have increased from period 1 to period 2. In period 1 in group A, the value of tangibles is at 3.91. After the intervention, in the form of improvements to the learning method and the addition of facilities, there was a change in value in period 2, to a score of 4.25, or an increase of 8%. Similar improvements are also observed in other aspects. In the reliability aspect (the ability to deliver material) and the responsiveness aspects (responsibilities) also increased by 7.73% and 14.81% respectively. Likewise, aspects of assurance (guarantee of process quality) and empathy (heart-to-heart/family approach) increased by 21.79% and 14.29% respectively.

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## REFERENCES

- Ali, M. (2009). Development of Interactive Learning Media Courses in Electromagnetic Fields. *Educational Journal @ elektro*. Vol 5 (1). Pp. 11-18.
- Anonymous. (2015). *Bali State Polytechnic Strategic Plan*. Denpasar: Bali State Polytechnic
- Bakta, I. M. (2000). Clinical Test. *Internal Medicine Journal*. May; Vol. 1 (2). Pp. 99-107.
- Bisri, K., Samsudi, & Suprpto. (2009). Effectiveness of the Use of eLearning Learning Methods on Student Learning Achievement in the Manual/Component Transmission Maintenance/Service Competence. *Journal of Mechanical Engineering Education*. Vol 9 (1). Pp. 37-42.



- Bose, M. & Dey, A. (2009). *Optimal Crossover Designs*. Singapore: World Scientific Publishing Co. Pte. Ltd. Pp. 59-69.
- Brahmasari, I. A. & Suprayetno, A. (2008). Effect of Work Motivation, Leadership and Organizational Culture on Employee Satisfaction and Its Impact on Company Performance. *Journal of Management and Entrepreneurship*. Vol 10 (2). Pp. 124-135.
- Effendi, L. A. (2012). Learning Mathematics with Guided Discovery Methods to Improve the Representation Capability and Solving Mathematical Problems of Middle School Students. *Journal of Educational Research*. October: Vol 13 (2). Pp. 1-10.
- Indiyani, N. E. (2006). Effectiveness of Cooperative Learning Methods to Reduce Anxiety in Facing Mathematics Lessons. *Diponegoro University Psychology Journal*. Vol 3 (1). Pp. 10-28.
- Kurniawan, H. and Istiningrum, A. A. (2012). Application of Cooperative Learning Methods Think Pair Share Techniques to Improve Learning Motivation Basic Competence Accounting Calculate Funds Mutations. *Indonesian Journal of Accounting Education*. Vol 10 (1). Pp. 114-134.
- Nurani, Y. (2003). *Main Material of Learning Strategy*. Print 1. Jakarta: Open University Publishing Center.
- Panudju, A. (2003). Effects of Compensation and Job Characteristics on Employee Job Satisfaction for the Production of PT. X., Palembang. *Sriwijaya Management and Business Journal*. Vol 1 (2). Pp. 1-17.
- Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1988). Servqual: A Multi-item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing*. 64 (1), Pp. 12-40.
- Riyanto, Y. (2001). *Educational Research Methodology*. Print 2. Surabaya: SIC.
- Soemarto, S. (2005). Interactive Learning Multimedia Development Course Course. *Journal of Innovation and Technology Applications*. February: Vol 9 (1). Pp. 116-122.
- Steven, P. (2005). *Crossover Design in Clinical Trials: A Methodologic Perspective*. Hoboken's 2nd Edition. New York: John Wiley & Sons, Inc. pp. 515-25.
- Suprpta, O. I. G. N. (2012). "Improving the Condition of the Learning Environment Can Improve Learning Achievement" (*Dissertation*). Denpasar: Udayana University Postgraduate Program.
- Suryawati, C. (2004). Hospital Patient Satisfaction (Theoretical Review and Its Application to Research). *Health Management and Service Journal* Vol. 9 (1). Pp. 189-194.
- Syairuddin, B., Patdono, S., Suartika, I. M. (2007). Design and Implementation of Performance Measurement Systems with Integrated Performance Measurement Systems Method (case study: Department of Mechanical Engineering, University of Mataram). *Journal of Industrial Engineering (scientific journal and Application of Industrial Engineering)* Vol. 9 (2). Pp. 131-143.
- Wahyudin, & Sutikno, A. I. (2010). Effectiveness of Multimedia Assisted Learning Using Guided Inquiry Methods to Increase Student Interest and Understanding. *Journal of Indonesian Physics Education*. Vol 6 (1). Pp. 58-62.
- Widana, I. K., Sudiarta, I. K. (2017). The Benefit of Improved Aspects of Human Physiology in the Learning Process. *Advanced Science Letters (ASL) Journal*. Vol 23 (12). Pp. 12116-12120.
- Widana, I. K., Sumetri, N. W., & Sutapa, I. K., (2018). Ergonomic Work Station Design to Improve Workload Quality and Productivity of the Craftsmen. *Journal of Physics*. Conference Series, Vol 953.
- Widana, I. K. (2018). The Degree of Subjective Complaints of Students Practice in Mechanical Technology Laboratories. *International Journal of Engineering, IT & Scientific Research*, Vol 4 No. 1, January 2018, ISSN: 2454-2261, Pp. 22-28.
- Widiatmoko A. (2012). Development of Science Physics Learning Tools with Approach to Physics Edutainment Assisted by Interactive Learning CD. *Journal of Primary Education*. Vol 1 (1). Pp. 38-44.