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Comparison of Physics Teacher's Forecast Grade and Actual Grade Obtained by Candidates in Cambridge AS and A-Level International Examinations: A Case Study of an Advanced Level School in Ibadan, Oyo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors EAO and ATA designed the study and wrote the first draft of the manuscript. Authors OOA, TOA and KAB managed the analyses of the study as well as the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: This paper examined a comparative assessment of teacher's forecast and actual grades obtained by students who sat for Cambridge AS and A-Level International Examinations in an Advanced Level School, Ibadan, Oyo State, Nigeria for five (5) consecutive years.

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Study Design: The teacher's mark book which documented the forecasted grades for Physics in Cambridge AS and A-Level International Examinations from the year 2014 to 2018 was consulted and compared with the actual grades obtained by students over the same period.

Methodology: Two hundred and thirty-five (235) students' results constitute the sampled population. Ahead of the time of final Cambridge International Examinations (CIE), some students who had withdrawn from the school system due to the fact that they are dead, terribly sick or gained admission into other higher institutions of learning and did not have their names on the CIE result broadsheets were disqualified from being part of the sampled population. This enabled the researchers to accurately compared the forecast grades of students who sat for CIE with the grades that they actually obtained. Shapiro-Wilk test of normality was carried out and the *P*-value was above 0.05 level of significance, as this shows that the data was parametric. SPSS version 23 was thereafter used to analyze the data and the hypothesis was tested using paired sample T-tests.

Results: There is no significant difference between Physics teacher's forecast grades and the actual grades obtained by students in Cambridge Advanced AS and A-Level International Examinations for 5 years (2014 - 2018) as the teacher's forecast grades for the last 7 examination series were accurate at *P* < 0.05 level of significance. The *P*-values; (0.083, 0.235, 0.260, 0.802, 0.328, 0.110 and 0.990) were above 0.05 significant level.

Conclusion: Findings from our study showed that there is no significant difference between Physics teacher's forecast and the actual grades obtained by the students in the Cambridge Assessment International Education for October/November 2015, May/June 2016, October/November 2016, May/June 2017, October/November 2017, May/June 2018 as well as October/November 2018 examination series.

Keywords: Comparison; physics teacher; forecast grade; actual grade; Cambridge international examination (CIE).

1. INTRODUCTION

The Cambridge Assessment was established at the University of Cambridge Local Examinations Syndicate (UCLES) by the University of Cambridge in the year 1858 [1.2]. According to Cambridge Assessment International Education (CAIE, 2018a), the examination started over 150 years ago with about 370 schools now deliver examinations and tests in about 170 countries globally [3-6]. The examination body aimed to raise standards in education by conducting examinations for students who were not University students as well as the inspecting schools respectively [1,2,7]. Cambridge International Advanced Subsidiary (AS) as well as the Advanced Level (A-Level) examinations are conducted by Cambridge International Examinations (CIE) to target the students whose age bracket are between 16 and 19 years [8-10]. Cambridge AS and A-Levels are subject-based qualifications usually taken in the last two years of high school. Findings from the research conducted by Golding and Kopsick (2019) and many other researchers suggest that the Cambridge curriculum prepares candidates well enough for university education [8,11, 12].

These international examinations (AS and A-Level) is reported on a grade scale basis, such that; A* (90 - 100% scores), A (80 - 89% scores), B (70 - 79% scores), C (60 - 69% scores), D (50 - 59% scores), E (40 - 49% scores) as well as U (less than 40% scores) [6,9,10]. Additionally, certificate is given for passing the examinations in a-three combinable subjects within the CIE syllabi (i.e. Physics, Chemistry and Biology) for candidates in biological or medical-related disciplines. (Chemistry, **Mathematics** and Physics) for candidates in engineering and other physical and mathematical related disciplines. Students use Cambridge International AS and A Levels to gain admission into leading Universities globally, although the admission criteria differ from institution to institutions (Cambridge International Assessment International Education: Cambridge International AS and A Level; A guide for universities) [8]. Furthermore, there are five components for a student who offers Physics at Cambridge International AS and A Level Examinations. These components are:

 (i) Paper 1 (Multiple Choice): This paper consists of 40 multiple choice questions, all with four options. All questions are based on the AS Level syllabus content. Candidates are required to answer all questions within 1 hour 15 minutes as this contributes 15.5% to their final grade.

- (ii) Paper 2 (AS Level Structured Questions): This paper consists of a variable number of questions of variable mark value. All questions are based on the AS Level syllabus content and this contributes 23% to their final grade.
- (iii) Paper 3 (Advanced Practical Skills): This paper requires candidates to carry out practical work in timed conditions. The paper usually consists of two experiments drawn from different areas of Physics. The experiments may be based on Physics not included in the syllabus content, but candidates are assessed on their practical skills rather than their knowledge of theory as this contributes 11.5% to their final grade.
- (iv) Paper 4 (A Level Structured Questions): This paper consists of a variable number of questions of variable mark values. All questions are based on the A Level syllabus but may require knowledge of materials first encountered in the AS Level syllabus and this contributes 38.5% to their final grade.
- (v) Paper 5 (Planning, Analysis and Evaluation): This paper consists of two questions of equal mark value based on the practical skills of planning, analysis as well as evaluation. Candidates are required to answer both questions within 1 hour 15 minutes and it contributes 11.5% to their final grade [8].

In another way, it is the norm of CIE that subject teacher must predict grades for their students ahead of the examination period. These grades must reach the CIE's office on or before the 30th of April for the May/June examination series and the 31st of October for the October/November examination series [13-16]. A forecast grade is a grade a teacher expects a candidate to score for the syllabus. It is supposed to be a realistic prediction of what the candidate is expected to get in the examination [17]. Forecast grades are used by CIE for the following reasons:

- (i) To inform decisions about syllabus grade thresholds.
- (ii) To help make a post-examination amendment to a student's mark in case there is a need to apply for special considerations.
- (iii) To carry out checks and balances before results are released, this is done by

comparing actual grades with forecast grades.

(iv) To allocate grades to candidates in a situation where a student's script may have been lost in the post [18].

The situation with the Coronavirus disease (COVID-19) outbreak in the year 2020 led CIE to take a difficult decision not to run her international examinations in the May/June 2020 series in many countries. As students were awarded grades based on the predictions of the teachers. These forecasted grades are also used by universities and colleges, as part of the admissions process, so as to help them understand candidates' potentials [8,19].

1.1 Risks of Inflating Predicted Grades

Teachers may inflate forecasted grades in order to give applicants a better chance of receiving an offer of admission for a certain course [19]. However, this is not without risk, as this could be to their disadvantage. In a case where the student needs to apply for special consideration allowances for some to make adverse circumstances, CIE needs to compare predicted grades of other candidates with their actual grades. If there is no significant difference, whatever the teacher has predicted for such candidate will stand [17]. Apart from this, applicants may receive an offer they are unlikely to meet, which invariably leads to disappointment on the result day. Similarly, if a university or college has reasons to believe that a predicted grade is grossly inaccurate, they retain the right to withdraw such offer of admission [19].

1.2 Risks of Suppressing Predicted Grades

In a situation where teachers reduces the predicted grades for some demanding courses, as a result of a belief system that this will enable students get admission into any less competitive course [19]. The setback is that a student may miss out an offer of admission from his/her preferred course of choice, based on suppressed predicted grades.

1.3 Statement of Problem

As a result of COVID-19 pandemic which ravaged the entire globe in the year 2020, all examinations that are scheduled to hold in 2020 were postponed. Going by this, another method was designed and implemented to determine the grades to be awarded to candidates in 2020. An algorithm was produced in June 2020 in Northern Ireland for grades standardization [20]. This algorithm combats grade inflation system as it was used to moderate the existing but unpublished teacher-forecasted grades for GCE Advanced Level and GCSE students [14, 20-22]. After this, there was an uproar in some by candidates that their results were lowered [20, 23-26]. This situation made CIE to review the grades which was initially awarded to student. However, if teachers were sincere in their students' forecast grades, probably there would not be any need for grade standardization in any case [26].

Recently, as a result of the COVID-19 situations in some countries, CIE had announced that May/June 2021 CIE will hold in countries permitted by their national authorities. In countries or regions where examination does not run, Cambridge will switch from examination to a teacher assessment approach as this will only apply to all schools in those countries [27].

1.4 Purpose of the Study

The main purpose of this study is to compare and contrast the physics teacher's forecast grade and the actual grade gotten by candidates in Cambridge AS and A-Level Physics International Examinations for 5 consecutive years (2014 to 2018).

1.5 Research Question

Is there any significant difference between the Physics teacher's forecast grade and the actual grade obtained by candidates in Cambridge AS and A-Level Physics International Examinations?

1.6 Research Hypothesis

Ho: There is no significant difference between Physics teacher's forecast grade and the actual grade gotten by the students in Cambridge AS and A-Level Physics International Examinations.

2. MATERIALS AND METHODS

This study is a comparative assessment of Physics teacher's forecast grades and actual grades obtained by students who sat for Physics in Cambridge AS and A-Level International Examinations in ISI, University of Ibadan, Oyo State, Nigeria between 2014 and 2018. Since Cambridge Examination is biennial (May/June and October/November diets), a total of ten (10) different sets of students were involved in this

study. The results of the May/June and October/November series were utilized. The teacher's mark book which documented the forecast grade for every student that sat for Physics in Cambridge AS and A-Level examinations between 2014 and 2018 was consulted. A total of 235 students' results constitute the population. It was observed that, ahead of the time of final CIE, some students withdrew from the school system because they are dead, terribly sick or gained admission into other higher institutions and could not sit for Cambridge International AS and A-Level Examinations. Such students had their names missing on the CIE result sheets and were disqualified from being part of the population. This enabled the researchers to accurately compare the forecasted grades of students who sat for CIE with the obtained grade. An oral interview was conducted with the teacher to know when he started teaching Cambridge advanced level physics and when he began to forecast grades for students. This enables the researchers to know the level of experience the teacher had in teaching Cambridge A' Level physics. The scores were coded as $A^* = 6$, A = 5, B = 4, C = 3, D = 2, E = 1 and U = 0. Shapiro-Wilk test of normality was carried out and the Pvalues were all above 0.05 level of significance. SPSS version 23 was used in analyzing the data and the research question was answered; inferential statistics of independent Sample T-test was used to test the hypothesis.

3. RESULTS AND DISCUSSION

Table 1 below revealed that only 9 students (26.5%) got the exact grades predicted by the teacher in their final examination, 19 students (55.9%) got lower while 6 students (17.6%) got higher than the grades forecasted. The result of paired t-test analysis in Table 1 below revealed a significant difference between teacher's forecast grades and the actual grades obtained by the candidates in May/June 2014 Cambridge International Examinations series. This is evident by the t-value of 0.004 which is less than 0.05, the standard level of significance.

Table 2 below revealed that only 10 students (41.7%) got the exact grades predicted by the teacher in their final examination, 13 students (54.2%) got lower while 1 student (4.2%) got higher than the grades forecasted. The result of paired t-test analysis in Table 2 revealed a significant difference between teacher's forecast grades and the actual grades obtained by the candidates in October/November 2014 CIE

series. This is evident by the t-value of 0.001 which is less than 0.05 level of significance.

Table 3 below revealed that 11 students (52.4%) got the exact grades predicted by the teacher in their final examination, 7 students (33.3%) got lower while 3 students (14.3%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.042 which is less than 0.05 at df (20). This shows a significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2015 May/June examination series. The result implies that the teacher is not accurate in his predictions.

Table 4 below showed that 13 students (59.1%) got the exact grades predicted by the teacher in their final examination, 6 students (27.3%) got lower while 3 students (13.6%) got higher than the grades forecasted. It was also observed from that t-value = 0.083 which is greater than 0.05 at df (21). This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2015 October/November examination series. The result implies that the teacher is accurate in his predictions.

Table 5 below showed that 5 students (19.2%) got the exact grades predicted by the teacher in their final examination, 13 students (50.0%) got lower while 8 students (30.8%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.235 which is greater than 0.05. This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2016 May/June examination series. The result implies that the teacher was accurate in his predictions.

Table 6 below revealed that 12 students (48.0%) got the exact grades predicted by the teacher in their final examination, 9 students (36.0%) got lower while 4 students (16.0%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.260 which is greater than 0.05. This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2016 October/November examination series. The result implies that the teacher was accurate in his predictions.

Table 7 showed that 15 students (55.6%) got the exact grades predicted by the teacher in their final examination, 6 students (22.2%) got lower while 6 students (22.2%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.802 which is greater than 0.05 at df (26). This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2016 May/June examination series. The result implies that the teacher was accurate in his predictions.

Table 8 below revealed that 14 students (60.9%) got the exact grades predicted by the teacher in their final examination, 6 students (26.1%) got lower while 3 students (13.0%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.328 which is greater than 0.05 at df (22). This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2017 October/November examination series. The result implies that the teacher was accurate in his predictions.

Table 9 below revealed that 9 students (45.0%) got the exact grades predicted by the teacher in their final examination, 7 students (35.0%) got lower while 4 students (20.0%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.110 which is greater than 0.05 at df (19). This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A Level Physics International Examinations in the 2018 May/June examination series. The result implies that the teacher was accurate in his predictions.

Table 10 below revealed that 6 students (26.1%) got the exact grades predicted by the teacher in their final examination, 9 students (39.1%) got lower while 8 students (34.8%) got higher than the grades forecasted. It was also observed from the table that t-value = 0.990 which is greater than 0.05 at df (22). This shows no significant difference between Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations in the 2018 October/November examination series. The result implies that the teacher was accurate in his predictions.

Table 1. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2014 May/June Series)

Paired differences										
Forecast Grade for May/June 2014	Mean	S.D.	Number and percentage of	Number and percentage of candidates whose actual grade(s):				Sig. (2 tailed)		
paired with Actual Grade for			Equals to forecast grade	Less than forecast grade	Greater than forecast grade			-		
May/June 2014	.529	.992	9 (26.5%)	19 (55.9%)	6 (17.6%)	3.112	33	0.004		

 Table 2. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics

 International Examinations (2014 October/November Series)

Paired differences										
Forecast Grade for Oct/Nov 2014	Mean	S .D.	Number and percentage of candidates whose actual grades:			t	df	Sig. (2 tailed)		
paired with Actual Grade for			Equals to forecast grades	Less than forecast grades	Greater than forecast grades					
Oct/Nov 2014	.667	.816	10 (41.7%)	13 (54.2%)	1 (4.2%)	4.000	23	.001		

Table 3. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2015 May/June Series)

Paired differences										
Forecast Grade for May/June	Mean	S.D.	Number and percentage of candidates whose actual grades:			t	df	Sig. (2 tailed)		
2015 paired with Actual Grade for			Equals to forecast grades	Less than forecast grades	Greater than forecast grades					
May/June 2015	.381	.805	11 (52.4%)	7 (33.3%)	3 (14.3%)	2.169	20	.042		

Table 4. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2015 October/November Series)

Paired differences										
Forecast Grade for Oct/Nov 2015	Mean	S.D.	S.D. Number and percentage of candidates whose actual grades:				df	Sig. (2 tailed)		
paired with Actual Grade for			Equals to forecast grades	Less than forecast grades	Greater than forecast grades			_		
Oct/Nov 2015	.273	.703	13 (59.1%)	6 (27.3%)	3 (13.6%)	1.821	21	.083		

Table 5. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2016 May/June Series)

	Paired Differences										
Forecast Grade for May/June	Mean	S.D.	Number and percentage of	Number and percentage of candidates whose actual grades:				Sig. (2 tailed)			
2016 paired with Actual			Equals to forecast grades	Less than forecast grades	Greater than forecast grades	_		-			
Grade for May/June 2016	.308	1.289	5 (19.2%)	13 (50.0%)	8 (30.8%)	1.217	25	.235			

Table 6. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2016 October/November Series)

Paired differences										
Forecast Grade for Oct/Nov	Mean	an S.D. Number and percentage of candidates whose actual grades:				t	df	Sig. (2 tailed)		
2016 paired with Actual			Equals to forecast grades	Less than forecast grades	Greater than forecast grades					
Grade for Oct/Nov 2016	.200	.866	12 (48.0%)	9 (36.0%)	4 (16.0%)	1.155	24	.260		

Table 7. Paired Samples T-Test analysis showing the difference in Physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2017 May/June Series)

Paired differences										
Forecast Grade for May/June Mean S.D. Number and percentage of candidates whose actual grades:					t	df	Sig. (2 tailed)			
2017 paired with Actual			Equals to forecast grades	Less than forecast grades	Greater than forecast grades	_				
Grade for May/June 2017	037	.759	15 (55.6%)	6 (22.2%)	6 (22.2%)	-2.54	26	.802		

Table 8. Paired Samples T-Test analysis showing the difference in physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2017 October/November Series)

Paired differences										
Forecast Grade for Oct/Nov	Mean	S.D.	Number and percentage of candidates whose actual grades:				df	Sig. (2 tailed)		
2017 paired with Actual			Equals to forecast grades	Less than forecast grades	Greater than forecast grades			_		
Grade for Oct/Nov 2017	.130	.626	14 (60.9%)	6 (26.1%)	3 (13.0%)	1.000	22	.328		

Table 9. Paired Samples T-Test analysis showing the difference in physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2018 May/June Series)

	Paired D	ifferences						
Forecast Grade for May/June	Mean	S.D.	Number and percentage of candidates whose actual grades:				df	Sig. (2 tailed)
2018 paired with Actual			Equals to forecast grades	Less than forecast grades	Greater than forecast grades			
Grade for May/June 2018	.300	.801	9 (45.0%)	7 (35.0%)	4 (20.0%)	1.674	19	.110

Table 10. Paired Samples T-Test analysis showing the difference in physics teacher's forecast grade and actual grade obtained by students in Cambridge AS and A-Level Physics International Examinations (2018 October/November Series)

Paired Differences										
Forecast Grade for Oct/Nov	Mean	S.D.	Number and percentage of candidates whose actual grades:				df	Sig. (2 tailed)		
2018 paired with Actual			Equals to forecast grades	Less than forecast grades	Greater than forecast grades			-		
Grade for Oct/Nov 2018	.000	1.087	6 (26.1%)	9 (39.1%)	8 (34.8%)	.000	22	.999		

From the tables above it was observed that the percentages of candidates who got the exact grades predicted by the teacher increases from just 26.5% in May/June 2014 CIE series to 60.9% in October/November 2017 CIE series, it later dropped to 45.0% in May/June 2018 and 26.1% in October/November 2018 CIE series. This increase in percentage can be traced to the fact that the teacher is probably becoming acquitted to Cambridge system of grading. Though the percentages dropped in May/June 2018 and October/November 2018 examination series, but by comparing the number of students that got above the predicted grades to those who got below the predicted grades, they are almost the same. The result of the paired t-test analysis showed that the teacher's predictions of students' forecast grades for the first three (3) examination series (May/June 2014. October/November 2014 and Mav/June 2015) were wrong since the P-values (0.004, 0.001 and 0.042) were all below the 0.05 level of significance. There exist significant differences between teacher's forecast grade and the actual grades obtained by the students who sat for those examination series.

Moreover, the teacher's prediction of students' forecast grades for the last seven (7) examination series (October/November 2015, May/June 2016. October/November 2016. May/June 2017, October/November 2017. May/June 2018, October/November 2018) was accurate at a 0.05 level of significance. The Pvalues (0.083, 0.235, 0.260, 0.802, 0.328, 0.110 and 0.990) respectively, were all above 0.05 level of significant. There is no significant difference between the teacher's forecast grade and the actual grades obtained by the students who sat for the last seven examination series.

Furthermore, the null hypothesis which says that there is no significant difference between Physics teacher's forecast grades and the actual grades obtained by students in Advanced Level Cambridge International Examinations can be accepted based on the results of the last seven series.

Lastly, findings from this research further indicates that; teachers need some time to get used to the Cambridge system of awarding grades. The more time a teacher spends teaching the Physics syllabus, the more the teacher become familiar with the system [28-31]. This is evident in the results obtained as shown in Tables 1 to 10. When the teacher was still new in the system of teaching Cambridge A-Level physics, all predictions were wrong, but after spending a minimum of about 2 years on the job, the predictions were more accurate.

4. CONCLUSION

Findings from this study revealed that there is no significant difference between Physics teacher's forecast and actual grades obtained by students in the Cambridge Assessment International Education for October/November 2015. May/June 2016, Oct/Nov 2016, May/June 2017, October/November 2017, May/June 2018, October/November 2018, examination series in the sampled population. However, it was noticed that the predictions for the first three (3) series of examinations (Mav/June 2014. October/November 2014 and May/June 2015) were inaccurate. According to the response gotten from the teacher when interviewed; the teacher started forecasting grades for students in October/November 2013 examination series. This implies that the teacher has not spent enough time to get acclimatized with Cambridge mode of assessing students and this could be the reason for the significant difference observed between his forecast grades and the actual grades obtained by the students. However, subsequent examinations indicate some level of accuracy.

5. RECOMMENDATIONS

Based on the findings from this study, the following recommendations were made:

- New teachers need some time to get acquainted with the Cambridge system of awarding grades. During this time, they should not be allowed to forecast grades for students alone, rather they can work with an experienced teacher who already understands the system. In this respect, school administrators are advised to employed at least two teachers for each subject; in case one teacher resigned or leave the school system, there will always be a teacher to train newly recruited ones.
- 2. Teachers should be grant access to the CIE result broadsheet of their students so that they can do self-comparison between what has been forecasted for students and what the students actually obtained.
- 3. Teachers are encouraged to forecast their students' grades based on trend in performance observed in students. This

can be achieved by using the results obtained by students in their mock examination, tests or assessments as their forecast grade.

4. Teachers should be allowed and encouraged to partake in workshops and trainings organized by CIE

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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