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Science Teachers' Attitudes Towards Internal Assessment System at The Secondary Level

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Abstract

Science Teachers' Attitudes Towards Internal Assessment System at The Secondary Level attempts to find out attitude of teachers towards the Internal (formative) assessment (FA) system in secondary level science classroom in surkhet district. For this study, forty-one secondary level science teachers of surkhet district were selected through random sampling procedure. After selecting the respondent, the questionnaires with five points Linkert Scale to study attitude of respondent on FA including their perception, experience and belief about FA was constructed with the helps of expert and send to each respondent through online. The major findings of the study show that teacher had positive attitude in practice of formative assessment system in secondary level science classroom despite there were several difficulties faced by science teacher during implementation of FA in classroom such as time & effort consuming, costly, resisted by student, lack of resources & technology, varying level and prior knowledge of student etc. This study also concludes that, almost all teacher of secondary level either often or always or sometime used at least one formative assessment tool among observation, open-ended question, close-ended question, peer feedback, think –pair share, quizzes, self-assessment and concept mapping in their classroom. Thus, it this study concluded that, in secondary level schools of surkhet district science teacher were implementing FA tools successfully even there were a lot of challenges for implementing it in science classroom.

Introduction

Evaluation refers to the systematic assessment or analysis of a subject, process, program, product, or system to determine its value, effectiveness, quality, or impact. It is used across various fields to inform decision-making, improve outcomes, and ensure accountability. Learning is a lifelong process that starts at birth and lasts until death. Early life is extremely important since it impacts subsequent processes. However, because children are cared for by their families until they start school, we are unable to fully manage the early stages. Children's educational process is influenced by a variety of circumstances, including peers both inside and outside of school, even if they attend school (Arslan, 2018). Russel (1926) explains that education should provide children to develop their capabilities and skills. An education system should offer opportunity for children to receive the highest level of education. Furthermore, Durkheim (1956) underlines that the focus and primary function of education is to prepare children for their roles as workers and members of a larger society and identifies the purpose of education as the shaping of the social being.

Assessment is considered fundamental to the learning process and is regarded as crucial for effective teaching, playing a vital role in enhancing student performance by facilitating learning (Absolum et al., 2009 as cited by Frances Edwards). In other words, assessment can be defined as the process of evaluating a person's or a group's performance or knowledge and making decisions based on the data considered. Educational assessment involves teachers who applying

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their understandings to know how student develops skills and knowledge, attitudes and values in a subject domain. Then, through the collection of evidence of student's performance and reasoning from this evidence, teachers work to understand what students are learning or have learned (Chudnovsky, & Glaser, 2001).

In science education, assessments are an integral part which is systematic process of gathering information about what a student's knows, is able to do, and is learning to do. The primary purpose of assessments is not to evaluate and classify student's performance, but to inform teaching and improve learning, and to mentor student's progress in achieving learning outcomes at the end of a grade or course of study. Assessment in education comes in various types, each serving a specific purpose in evaluating and enhancing learning. Some different types of assessments are; diagnostic assessment, norm referenced assessment, criterion referenced assessment, performance assessment, portfolio assessment, self-assessment and peer assessment, high-stakes and low-stakes assessment. In the vision of science education described by the Standards, teachers use the assessment data in many ways. Some of the ways teachers might use these data are; improving classroom practice by collecting information about students' understanding continuously and make adjustments to their teaching on the basis of their interpretation of that information, using assessment data to plan curricula by incorporating selected into a course of study, a module, a unit, or a lesson, developing self-directed learners by providing opportunity to evaluate and reflect on their own scientific understanding and ability to student, reporting student progress and researching teaching practices (NASEM, 1996).

There is closed relationship between science instruction and science assessment. The nature of assessment is needed to be developed in the nature of science as inquiry, active assessment for active science. Assessment can be differentiated into 'assessment of learning', 'assessment for learning', and 'assessment as learning' based on the goal, whereas based on its function it can be differentiated into formative assessment and summative assessment. Formative assessment directs the learners to learn further, while summative assessment tends to direct the learner to compete each other (NASEM, 1996). Assessment in science can take many forms but broadly involves assessment for learning (summative), and assessment of learning (formative).

The Six Key Elements of Formative Assessment

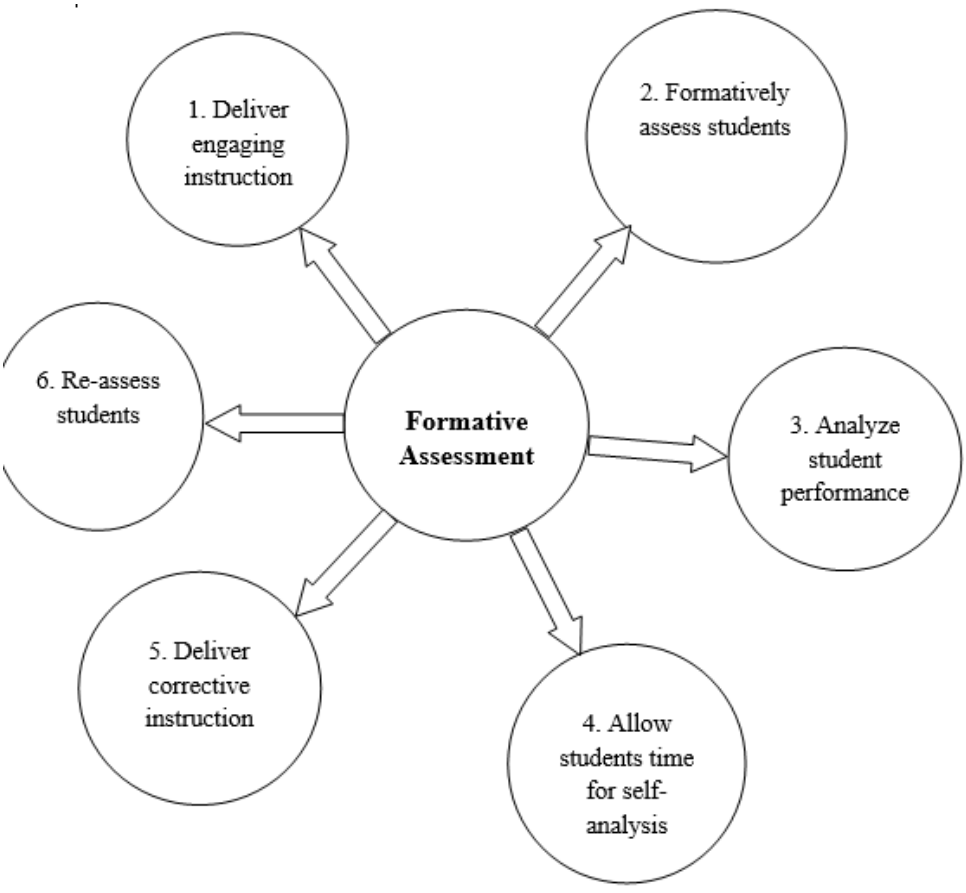

Figure 1: The six key elements of formative assessment (OECD, 2005).

When a teacher understands exactly what their students know before and during instruction, they can be more effective than if they were to find out what students know after a lesson or unit is complete. Formative assessment is powerful because of the critical information it provides about student comprehension throughout the learning process. It also allows educators to respond immediately and adjust instruction so that every student experiences success. The

formative assessment is one of the most impactful tools to increase student achievement. Below are six steps to help guide in rigorous formative assessment (OECD, 2005).

Statement of the Problem

It is found that applying and understanding science is too difficult in my ten years teaching and learning experiences. The government, parents, researcher, students and science teachers are particularly concerned about the low science performance of students. In the context of Nepal, out of five core subjects, achievement of student in science is very poor. Most of the students are unsuccessful in science; even if they are successful, they are not able to score better. If we observe the SEE result and National Assessment of Student Achievement report, the national average score of science in secondary level is not good (ERO, 2022), which are not in the satisfactory level. Even there were the policies of formative as well as summative assessment system for students' academic evaluation but the implementation part of educational policies in the context of Nepal is in critical condition. However, formative assessment is a process used by teachers and students during instruction which provide feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes (McManus, 2008). Is this happing in Nepal? It may be a leading concern of research in case of effective implementation of education policies and their contribution in students' achievement. The most important function of formative assessment is for improving students' learning achievement (Berry & Adamson, 2011). However, students' motivation, creativity and assessment for learning practices in Nepali community schools seem to be not supportive to their leaning improvement (Parajuli & Das, 2013). What are the existing practices of students' assessment for learning and implementation of education policies in secondary science classroom? These are very crucial issues to be addressed through academic research but any researchers have not conducted any study on the issues in context of Nepalese secondary level science education.

Propose of the study

The main propose of this research to investigating the level of attitude of secondary level science teacher and their practices of Formative Assessment in science classroom. The specific objectives of the research are to find out the science teacher attitude towards formative assessment in secondary level classroom.

Methodology

I used qualitative survey methodology with five-point Lickert scale questionnaire with consist ten questions about science teacher performance towards formative assessment. The sample consisted of thirty secondary level science teachers in surkhet district were selected by applying random sampling method. Research tools are crucial to success the research work within time and such tools should be appropriate for particular research work. Since the research is quantitative research design. So, researcher uses survey questionnaires as data collection tools. The questionnaire utilized in the study was designed to gather data from participants in a structured manner. It included a combination of open-ended questions for demo graphaphic information like age, sex, teaching experience etc. of participant and closed-ended questions presented in a Likert scale which consists of 16 questions.

Science Teacher Attitude of Towards Assessment

Different researchers and educators have different views on assessments. Few researchers believed on that secondary level science teachers who have low interest or negative attitude towards assessment contributed to poor assessment practice. In this sense, Brookhart (2002) reviewed that teachers have negative attitudes towards tests used in such a way as to have what they perceive as negative consequences for their students. In other hands, Teshome (2001) has remarked that teachers must understand the assessment process and accept is as their own for its effective implementation. So this fact tell us that, insufficient training and lack of adequate materials, lack of orientation and assistance from the concerned expert make assessment difficult for teachers to appreciate and apply continuously in classroom.

Perception of Teacher's on Formative Assessment

In this section there were three sets of questions with altogether 27 statements of questions to obtain the information about attitude of secondary level science teachers towards formative assessment in classroom. The data were collected from 41 teachers who were teaching science in secondary level at different schools of surkhet district.

The data obtained from the questionnaire using five-point Linkert scale for attitude are presented in Table 1. Here an item was made to know about perception of science teachers about FA.

Items; Q1= Formative assessment allows teachers to gather feedback, identify areas of difficulty and adjust their teaching methods according to needs of their students. Q2= Formative assessment foster deep understanding of the content and encourages sense of ownership over their learning. Q3: Formative assessment practices are cost in nature. Q4: Overemphasis on formative assessment may accidentally increase pressure on students and undermine their intrinsic motivation to learn. Q5: Limited access to resources and technology effect the implementation of certain formative

assessment in classroom.Q6: The formative assessment may not always provide a comprehensive picture of student learning.Q7: Formative assessment is widely used assessment system.Q8: Formative assessment helps to enhanced the relation between student and teacher which may helps in learning of students.Q9: Formative assessment helps to improve the teaching techniques and strategies.Q10: Formative assessment motivate the teacher and student for learning.

As can be seen from the above Table, (31.70%) strongly agree and (63.40%) agree on statement, the formative assessment allows teachers to gather feedback, identify areas of difficulty and adjust their teaching methods according to needs of their students. The mean score of responses of teacher on this statement indicate that above average (mean=4.27). In line with this Black and Willium (1998) asserted that using assessment for a formative purpose is intended to guide students' learning processes and improve students' learning outcomes. However, only (4.9%) of the respondents did show neither agreement nor disagreement on this idea.

Table1: Summary of perception of science teachers on FA

S.N.	Items	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Mean	SD
		F	%	f	%	f	%	F	%	f	%		
1	Q1	13	31.7	26	63.4	2	4.9	0	0	0	0	4.27	0.55
2	Q2	11	26.8	25	61	4	9.8	1	2.4	0	0	4.12	0.66
3	Q3	5	12.2	13	31.7	6	14.6	14	34.1	3	7.3	3.10	1.21
4	Q4	5	12.2	20	48.8	3	7.3	11	26.8	2	4.9	3.46	1.15
5	Q5	9	22	25	61	2	4.9	5	12.2	0	0	3.93	0.88
6	Q6	6	14.6	21	51.2	5	12.2	7	17.1	2	4.9	3.54	1.09
7	Q7	6	15	23	57.5	5	12.5	6	15	6	15	3.73	0.89
8	Q8	14	35	22	55	4	10	0	0	0	0	4.27	0.63
9	Q9	22	55	18	45	0	0	0	0	0	0	4.53	0.5
10	Q10	16	40	19	47.5	3	7.5	2	5	0	0	4.20	0.81
Grand Mean= 3.90													

Here, out of total responses of secondary level science teacher, (26.8%) respondent teachers strongly agreed on statement where as (61%) respondent teachers were agreed on the idea formative assessment foster deep understanding of the content and encourages sense of ownership over their learning. So in total, (87.80%) of secondary level science teacher shows the positive attitudes towards the statements where as (9.8%) of responses were undecided on the statement. In regarding this statement, the mean score for responses was 4.12; this also indicates that the responses were positively inclination towards the statement. Hence it implies that, formative assessment is a powerful tool that fosters a deep understanding of content and encourages students to take ownership of their learning.

In addition to this, (43.9%) of the respondent teachers reported that FA practices are costly in nature. However, (41.46%) responses were disagreed on statement. But, (14.6%) of responses were undecided about the idea. So, there were almost equal positive and negative responses on statements. But, the mean score for responses was 3.07, indicating a slightly inclination towards the idea which indicate that the formative assessment practice may or may not be costly in nature. The costs of assessment will depends up on the assessment tools implemented by teacher in classroom. There were both types (costly and cheap) of formative assessment tools they could be used in classroom. Hence, teacher can select appropriate formative assessment tools in their classroom on the basis of their schools economic status. In the same way, larger proportion of respondents (60.97%) supported that FA may increases pressure on students and undermine their intrinsic motivation to learn when teacher overemphasis on it and the value mean (3.46) scores proved that is above average. Few of these respondents (31.70%) showed disagreement. In line with this, some research has consistently shown that formative assessment positively impacts student achievement. When implemented effectively, it can enhance learning outcomes, increase student engagement and self-regulation, and foster a growth mindset. But, few educationists also believed that the overemphasis on formative assessment can inadvertently create additional pressure on students and undermine their intrinsic motivation to learn (Andrade & Heritage, 2017).

The result for item Q5 (Table 1) depicted most of the respondent teachers (83%) reported that implementation of FA in classroom is effected by limited resources and technology available in school .However, the minority of respondents only (12.2%) response disagreed on this issue. Hence, the responses of secondary level science teacher show that, limited access to resources and technology significantly impacts the implementation of certain formative assessments in

the classroom as concluded by Bennett, 2011. This limitation can hinder the variety and quality of assessments, affect teacher training, and exacerbate educational inequities.

Furthermore, Table item Q6, portrayed that 67.5% of the respondent teachers strongly agreed and agreed that FA may not always provide a comprehensive picture of student learning. However, others 22.5% did not agree on this issue. The mean score for responses of respondent teacher is also above the average value (3.54) which supporting the idea. Along with this, Lansdown (2020) commented that FA is valuable tools for guiding instruction and providing real-time feedback to students, but they may not always provide a comprehensive picture of student learning.

The results obtained for item Q7 indicate most of the respondents 72.5% believed that FA is a widely used and essential assessment system that significantly contributes to the educational process. By providing continuous feedback and engaging students in their learning, formative assessments help improve educational outcomes and support individualized instruction. In other hands, while small proportion of these respondents (15%) believed that Formative assessment is not widely used assessment system where as, (12.5%) respondent teacher were undecided on issues. The mean value for this issue is above the average (3.73) with standard deviation 0.89. This result shows that, most of the participant are agreed on issue FA is widely used assessment system in science classroom as concluded by Bennett in 2011. As shown in table1, for item Q8, all most all respondents (90%) agreed that FA helps to enhance the relation between student and teacher which may helps in learning of students. The mean value for this issue is 4.27 (strongly agreed) and standard deviation is 0.63 (very minimum) also confirms that, FA is very helpful to make intense relation between teacher and students during teaching learning process. By providing personalized feedback, fostering active engagement, building trust, enabling responsive teaching, and offering positive reinforcement, formative assessments create a collaborative and supportive educational environment. Strengthening the student-teacher relationship through these practices not only helps students feel more connected and supported but also enhances their overall learning experience and academic success.

Similarly result for item Q9 of table 1 convey all (100%) respondent teacher of secondary level science agreed and strongly agreed on issue FA helps to improve the teaching techniques and learning strategies. The mean value above the average (4.53) and very least deviation of response of respondent (0.50) from mean response also indicates that most of respondent teacher was positive towards statements. The main aim of FA is to make teaching and learning effective and this result also strongly inclined towards this fact.

Eventually, in item Q10 of Table 1 almost all the respondents (87.5%) agreed on the idea that formative assessments motivate the teacher and student for learning. whereas only (5%) response were negative about the statement. The mean score for responses was 4.20 and standard deviation is 0.81, indicating a strongly positive inclination towards the statement. Hence, it concludes that, formative assessment is a critical factor in motivating both teachers and students. By setting clear goals, providing timely feedback, building confidence, and fostering a positive classroom environment, formative assessments encourage students to take an active role in their learning and motivate teachers to continuously refine their instructional methods. This dual motivation enhances the overall educational experience, leading to improved learning outcomes and a more dynamic and engaging classroom environment (Andersson & Palm, 2018).

In regarding the study of attitude of secondary level science teacher in terms of their perception about FA in secondary level science classroom most of respondent teacher have clear positive attitude towards formative assessment with grand mean of teachers (3.90) which is high above the average value.

Experience of Teacher's on Formative Assessment

In this section, the study focuses on experience of respondent teacher on formative assessments who were teaching different secondary school at surkhet district. This study includes the secondary level science teacher of Karnali providence who were working from many years (about 5 to 15 years). So they may have different experience on teaching science in secondary level and implementing formative assessment in their teaching time which helps researcher to conclude attitude of participant teacher about FA in science classroom. This theme includes seven questions. The Responses to the question related to teachers' experiences on FA with five-point Likert scale (strongly agree, agree, undecided, disagree and strongly disagree) are tabulated in table 2 with mean value and standard deviation.

Items: Q1=Trough formative assessment; teacher can identify misconceptions and knowledge gap of the students,Q2=Teacher who uses formative assessment in his/her classroom becomes more responsive in their teaching learning activities,Q3=Formative assessments that involve active student participation, such as peer assessment, self-assessment, and collaborative activities, can lead to increased students engagement in classroom,Q4=Designing formative assessment tools, providing regular and immediate feedback to the students is time consuming.Q5=Teachers training on assessment design and strategies for providing feedback helps teacher to enhance their assessment skills and confidence,Q6= Professional development training for teacher is required for effective use of formative assesment,Q7=

Providing regular feedback through formative assessment build strong relation between teacher and students.

Table2: Summary of experience of science teachers on FA

S.N.	Items	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Mean	SD
		F	%	f	%	f	%	F	%	F	%		
1	Q1	14	34.1	25	56.1	3	7.3	1	2.4	0	0	4.21	0.69
2	Q2	18	43.9	21	51.2	0	0	2	4.9	0	0	4.34	0.73
3	Q3	15	36.6	23	56.1	1	2.4	2	4.9	0	0	4.24	0.73
4	Q4	9	22.5	28	70	1	2.5	2	5	0	0	4.10	0.67
5	Q5	18	43.9	23	56.1	0	0	0	0	0	0	4.43	0.5
6	Q6	25	62.5	13	32.5	2	5	0	0	0	0	4.58	0.59
7	Q7	19	47.5	19	47.5	0	0	1	2.5	1	2.5	4.33	0.82
							Grand Mean= 4.32						

Responses for experience of respondent teacher on formative assessment in secondary level science classroom is presented in the Table 2 for this different questionnaire are asked to teacher about formative assessment which were used by teacher from long time in their classroom. As seen in table 2 for item Q1, it can be observed that most of respondent teachers (90.24%) reported that FA helps to identify misconceptions and knowledge gap of the students in secondary level science. Regarding this line, Tomlinson & Moon (2013) focus that Formative assessment is a vital component of effective teaching and learning at the secondary level which helps to identify misconceptions and knowledge gaps of students. Results in item Q2 of the above table indicate that (95.12%) teachers responded that teacher becomes more responsive in teaching their class while they using FA in his/her classes where as only (4.9%) of teacher were disagree on the statement. So, this result implies that, the teachers of secondary level who were used formative assessment in classroom become more responsive in teaching learning activities of student as compared to other teaching method one which is also supported by mean value (4.21) and standard deviation (0.69) for this item.

Formative assessments that involve active student participation, such as peer assessment, self-assessment, and collaborative activities, can lead to increased students engagement in classroom. Regarding item Q3 of table 3 the majority of (92.68 %) teacher respondents were strongly agreed and agreed on that FA implemented in science classroom leads increase in students engagement in classroom because in FA teacher always Conesus on how to make student active participation during learning. There were very few teacher (4.9%) respondents were disagreed the statement. The mean value (4.24) for teacher's responses on this item also leads the agreement on statement. In case of item Q4, designing formative assessment tools, providing regular and immediate feedback to the students is time consuming all the respondent teachers were agreed with mean value 4.10 and standard deviation 0.67 (very minimum value). Providing regular and immediate feedback about the subject content in science classroom to the students need sufficient time for teacher which is also depends upon number of students and their level of prior knowledge. Teacher training on assessment design and strategies is crucial for equipping educators with the skills needed to effectively evaluate student learning and improve educational outcomes. This training focuses on creating, implementing, and analyzing various assessment methods to provide meaningful feedback and guide instructional decisions knowledge about different types of assessments with their principle and tools helps teacher for designing formative assessments in classroom (Glaser, Chudowsky & Pellegrino, 2001).

In item Q5, researcher set question to explore experience of respondent teachers about role of teacher training to design FA and make strategies to provide feed to student in classroom. The table 2 shows that all respondent teachers were agreed on statement. The mean value for this item (4.43) and standard deviation (0.5) leads strong support toward agreement on statements. Similarly, for item Q6, the majority of the respondent teachers (92.68%) agreed on that professional development training for teacher is very necessary for effective use of FA in science classroom. The table 2 shows that, there was no one responses on disagreement on statement. The mean score of response on this item

(mean=4.58) show that the all-respondent teacher is strongly agreed on statements and the value of standard deviation (0.59) also reveals that there were no scattered-on responses of teachers from average response (strongly agree).

The ongoing interaction between teacher and students fosters a supportive and collaborative learning environment, enhancing both academic and personal development of student in classroom. The item Q7, present the responses of secondary level science teacher towards FA build strong relationship between teacher and student in classroom. In this context, result shows that almost all (92.68%) responses were have strong agreement on the statement but only very few (4.8%) are in disagreement with the statements. This result tells that, role of feedback on provided by teacher to student in class is very important for effective teaching and learning science.

In this regard, researcher found that most of the respondent teacher shows positive attitude towards FA on the basis of their experience on FA implementation and its functioning in teaching learning process of science. The overall mean (grand mean =4.32) also strongly supports on all statements.

Conclusion

The practice of formative assessment requires resources, tools and technologies with trained manpower. Without fulfilling these essential elements, it is difficult to practicing formative assessment in classroom. Therefore, based on the findings the following conclusions are drawn. The study revealed that large proportion of science teachers has clear perception and attitude about formative assessment. In this regard, the study concludes that, respondent teachers have a lot of positive experiences about implementation of FA and its impact in classroom such as FA helps to identify misconception of student, active learning in classroom, learning by peer group and collaboration, build strong relation between teacher and students etc. this study also conclude that FA is better than summative assessment taken at the last of unit/grade in written form. From the findings, it can be concluded that the majority of teachers use at least one of the formative assessment tools among; observation, open-ended question, close-ended question, peer feedback, think –pair share, quizzes, self-assessment and concept mapping often or always in their classroom. This implies science teachers have used the different methods of FA to increase the overall performance of student in science classroom. The study concludes that, various instructional resources, tools and technologies were required to implement Fa in science classroom but there are not sufficient in the sample secondary school. According to the study, school facilities and classroom learning environment are not supportive for implementation of formative assessment techniques.

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