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## **Integration of High Order Thinking Skills in Online-Based Elementary School Science Instruction Development Course**

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### Article Info

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#### Keywords

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### Abstract

This study aims to examine the integration of high-order thinking skills (HOTS) of students in the online-based Elementary School Science Instruction Development course at Universitas Sarjanawiyata Tamansiswa. The method used is descriptive qualitative. The research was conducted at Elementary School Teacher Education Study Program Universitas Sarjanawiyata Tamansiswa in the odd semester of the 2020-2021 academic year. The object of this research is subject Elementary School Science Instruction Development on planning, learning, assessment, and aspects of HOTS. Data collection techniques include documentation and observation methods. The data analysis consisted of 3 stages: data reduction, data presentation and conclusions. The results showed that the HOTS of students in the online-based Elementary School Science Instruction Development course at Universitas Sarjanawiyata Tamansiswa were integrated in three aspects of learning: planning, implementation, and assessment. In the learning plan, integration of HOTS skills seen in the use of the verb operating on learning outcomes and internalize the teachings of Ki Hadjar Dewantara “niteni, nirokke, nambahi” on learning activities. In the learning process, integration of HOTS appears in discussion activities. In the learning assessment, it is shown that the learning outcomes lies in HOTS level C6 (creating), namely students are able to compile learning scenarios according to the nature of science and elementary school science learning.

**Keywords:** *HOTS, online-based, Elementary School Science Instruction Development course*

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### Introduction

The spread of Covid-19 in Indonesia in June 2020 has not shown any signs of decreasing, instead the trend that is infected is increasing. This encourages the Ministry of Education and Culture to take steps to prevent transmission in the educational environment, namely by making a Joint Decree of 4 Ministers which agrees that the learning process, especially at the higher education level in the odd semester of the academic year 2020/2021 in all zones, must be held online for theory courses.

Instruction in college, whether carried out online or offline, should be able to engage students in higher order thinking activities (Tim Kurikulum dan Pembelajaran, 2014: 59). That activities make students accustomed to using reason and have higher-order thinking skills (HOTS). These skills can be obtained by students through continuous exercise. In science learning, students must also be required to think at a higher level.

Higher order thinking skill (HOTS) is a thinking process that does not just memorize and convey information that is known. HOTS are the ability to connect, manipulate, and transform existing knowledge with things or problems that have never been taught in learning (Tawil & Liliyasi, 2013; Andriyani, R., & Saputra, N. N., 2020). HOTS involve higher-order cognitive levels from Bloom's taxonomy. Bloom's Taxonomy in the cognitive domain consists of five levels, namely knowledge, understanding, application, synthesis, and evaluation. Anderson & Karthwol (2001) revised this taxonomic level into six levels, namely remembering (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5), and creating (C6).

Higher order thinking skills are needed nowadays. Especially in the era of the industrial revolution 4.0, where skills to analyze, solve problems and make fast and accurate decisions are needed so that they can remain competitive and not be left behind with the progress of the times with the rapidly accelerating development of science and technology.

The integration of higher order thinking skills for students can be carried out in various ways, one of which is internalization in the learning process in each subject. Lecture in college is adult learning or andragogy. Andragogy is an art and science that deals with ways of helping adults to learn (Knowles, 1997: 8). Andragogy is directed at the process of strengthening knowledge, skills and various provisions of experience in carrying out its functions and roles in life (Sujarwo, 2016: 159). Adult education has the signs of (a) being independent and self-directed, (b) active participation in group activities, (c) being critical and creative, (d) collaborating, (e) doing activity and experiencing (action learning), and (f) conduct self-evaluation or reflection.

In the conditions of the Covid-19 pandemic, where the implementation of online learning is a must for universities, the online learning mode held is at the course level. The implementation of online learning in the pandemic era was developed based on a process planning document which includes: (1) Design of learning experiences, (2) Composition of learning (independent / guided), (3) Learning strategies, (4) Guidelines for implementing learning, (5) Program map, which is a guide for developing online teaching materials, and (6) teaching materials (Direktorat Jenderal Pendidikan Tinggi, 2020: 1). All teaching materials must be available (guaranteed by the institution) before courses are run online. At the Universitas Sarjanawiyata Tamansiswa, the teaching materials prepared are the learning management system (LMS) namely sipedar.ustjogja.ac.id. The Elementary School Science Learning Development Course also uses this platform.

The Elementary School Science Learning Development course is a required subject for 5th semester students of elementary school teacher education (PGSD) Study Program. The learning outcomes of this course include aspects of attitude, knowledge, general skills, and specific skills. Lecture materials consist of: The Nature of Elementary Science and Natural Science Learning; Study of Elementary Natural Science Curriculum; Theory, Models, Approaches and Methods of Elementary Science Learning, Higher Order Thinking Skills in Science, Online Based Science Instruction in Elementary School; Elementary Science Learning Resources; and Evaluation Elementary Science Learning. After learning theory in lectures, students practice natural science learning through simulations.

The learning process in the Elementary School Natural Science Learning Development course in PGSD Universitas Sarjanawiyata Tamansiswa during the pandemic is directed so that students acquire HOTS. The integration of HOTS is carried out in teaching and learning activities which consist of planning, implementation and assessment. This article will examine the integration of high-order thinking skills of students in the online-based elementary science learning development course at Universitas Sarjanawiyata Tamansiswa.

## **Method**

The type of research used is qualitative with a descriptive approach. The research method used is descriptive qualitative. This research was conducted at the Sarjanawiyata Tamansiswa University. The research time is in the odd semester of the 2020-2021 academic year. The object is the Elementary Science Learning Development course in planning, learning process, evaluation, and aspects of higher-order thinking skills.

Data collection techniques include observation and documentation. The data analysis used was descriptive analysis which consisted of 3 stages, namely data reduction, data presentation and conclusion drawing. Data reduction was carried out by summarizing the data from the observations and documentation carried out during the study. Data presentation is carried out by displaying the data in a simpler way in the form of a brief description. Drawing conclusions is carried out by providing conclusions on the results of the interpretation and evaluation.

## **Results and Discussion**

The integration of high-level thinking skills of students in the online-based Elementary School Science Learning Development course at Sarjanawiyata Tamansiswa University is observed in three aspects, namely process planning, process implementation, and assessment. Each of these will be explained as follows.

## Learning Planning in the Course of Elementary Science Learning Development to Integrate Students' High Order Thinking Skills

Learning planning is a reference for carrying out learning activities so that it is more directional and runs effectively and efficiently (Aqib, 2008: 54). Learning planning should be flexible and provide ample possibilities for educators to adapt it to the competencies expected, in this case, students' higher order thinking skills. In planning the lesson Elementary School Science Learning Development Course, educators compile the lesson semester plan (RPS) and student worksheets (LKM).

RPS is prepared based on the format in the quality assurance document. In RPS, the integration of high-order thinking skills can be seen in several aspects, namely: course learning outcomes, course descriptions, expected final abilities, and student learning experiences.

Course learning outcomes (CPMK) using operational verbs with HOTS at levels C4, C5, and C6. Figure 1 is the application of HOTS to the CPMK in the RPS Elementary School Science Learning Development Course.

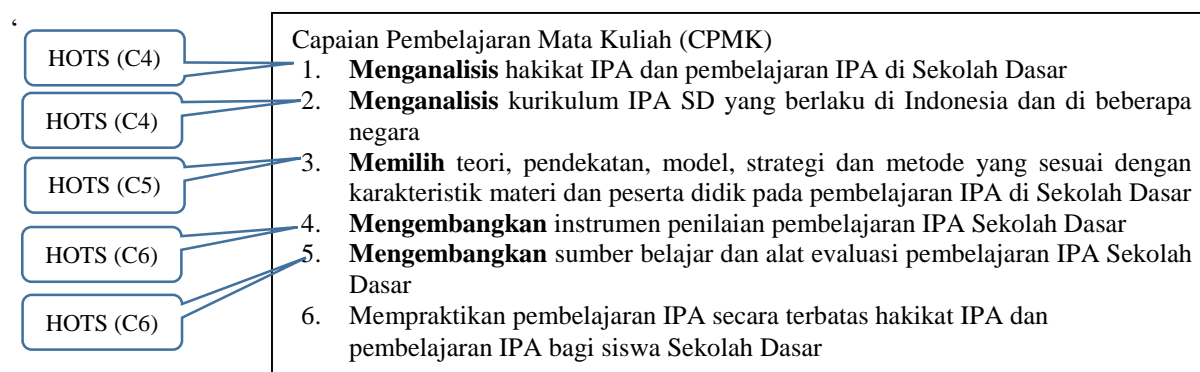


Figure 1. Integration HOTS in Learning Outcomes

Integration of HOTS in the course description seen in the internalization of Ki Hadjar Dewantara principle "niteni, nirokke, nambahi". The principle of "nambahi" is in accordance with the concept of higher order thinking skills at level C6, namely creating.

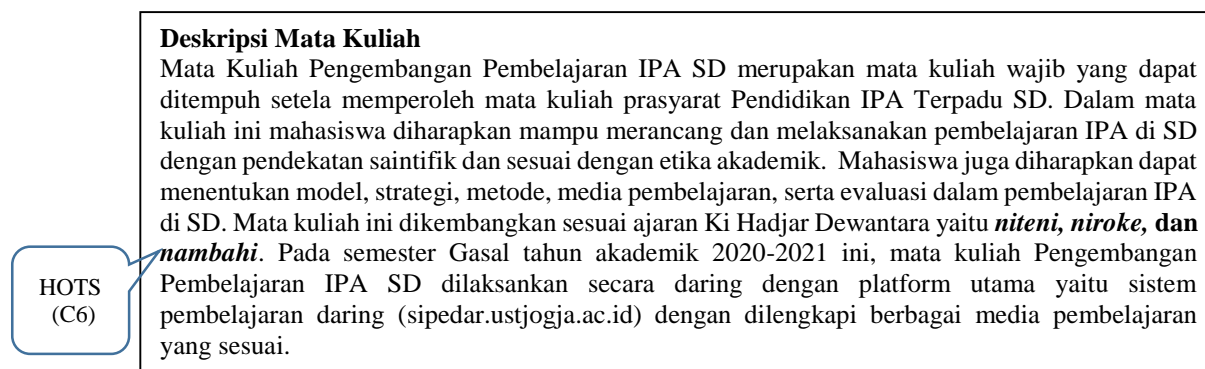


Figure 2. Integration HOTS in the Course Description

The application of HOTS to "expected final ability" in the RPS can be seen in the operational verbs used. Operational verbs with higher order thinking skills at levels C4, C5, and C6.

The integration of HOTS in "student learning experiences" at RPS can be seen in the internalization of Ki Hadjar Dewantara's principle "niteni, nirokke, nambahi". This explanation is almost the same as the application of HOTS in the "course description" in that student learning activities are directed so that students acquire higher order thinking skills. The principles of "niteni" and "nirokke" can be adapted to the concepts of higher order thinking skills levels C4 and C5. The principle of "nambahi" is in accordance with the concept of higher order thinking skills at level C6, creating. Figure 4 shows an example of HOTS application in the "student learning experience" of the second week meeting.

	Minggu ke-	Kemampuan Akhir yang Diharapkan
HOTS (C4)	1	<b>Menganalisis</b> hakikat IPA dan pembelajaran IPA SD
HOTS (C4)	2	<b>Menganalisis</b> kurikulum IPA SD
HOTS (C4)	3	<b>Menganalisis</b> indikator dan tujuan pembelajaran IPA SD
HOTS (C4)	4	Menjelaskan teori, pendekatan, model, strategi dan metode pembelajaran sesuai dengan tujuan pembelajaran, karakteristik siswa, serta kondisi lingkungan sekolah
HOTS (C5)	5	<b>Memilih</b> model pembelajaran IPA inovatif yang sesuai dengan karakteristik materi dan peserta didik pada pembelajaran IPA di Sekolah Dasar
HOTS (C4)	6	<b>Menganalisis</b> keterampilan berpikir tingkat tinggi dalam pembelajaran IPA SD
HOTS (C4)	7	<b>Mengidentifikasi</b> konsep pembelajaran IPA SD berbasis daring
HOTS (C4)	9	<b>Menyusun</b> alat evaluasi pembelajaran IPA SD
HOTS (C6)	10	<b>Membuat</b> rencana pelaksanaan pembelajaran IPA SD sesuai dengan kurikulum yang berlaku
HOTS (C6)	11-15	Melaksanakan pembelajaran IPA SD

Figure 3. Integration HOTS in Expected Final Ability

HOTS (C4)	1. Mahasiswa mencari informasi tentang kurikulum IPA SD di Indonesia dengan di beberapa negara ( <i>Niteni</i> )
HOTS (C6)	2. Mahasiswa menjelaskan informasi yang diperoleh tentang kurikulum IPA SD di Indonesia dengan di beberapa negara ( <i>Niroke</i> )
HOTS (C4)	3. Mahasiswa <b>menganalisis</b> perbedaan kurikulum IPA di Indonesia dan di beberapa negara ( <i>Nambahi</i> )
HOTS (C6)	4. Mahasiswa <b>menyusun</b> rencana bagaimana mengembangkan kurikulum agar pendidikan di Indonesia semakin baik ( <i>Nambahi</i> )

Figure 4. Integration of HOTS in Student Learning Experiences

In addition to the RPS, the application of HOTS in learning planning can be seen in student worksheet (LKM). LKM consists of three main parts, namely the introduction, the content and the closing. In the introduction, there is a Cover Page, Preface, and Table of Contents. The content section consists of 9 LKM given at meeting 1 to meeting 9. The closing section consists of a list of references and author's bio. In more detail, the contents of the LKM are shown in Figure 5.

LKM 1. Hakikat IPA dan Pembelajaran IPA SD
LKM 2. Kurikulum IPA SD
LKM 3. Indikator dan Tujuan Pembelajaran IPA SD
LKM 4. Teori, Pendekatan, Model, Strategi dan Metode Pembelajaran IPA SD
LKM 5. Model Pembelajaran IPA Inovatif di SD
LKM 6. Keterampilan Berpikir Tingkat Tinggi Siswa SD Dalam Pembelajaran IPA
LKM 7. Pembelajaran IPA SD Berbasis Daring
LKM 8. Evaluasi Pembelajaran IPA SD
LKM 9. Praktik Pembelajaran IPA SD

Figure 5. The Content of LKM

LKM is given to students in stages at each meeting. LKM is made in the form of microsoft word so that students can more easily fill in and answer questions in the space provided in the LKM. Figure 6 is an example of HOTS application in LKM 7. LKM 7 consists of two activities. In activity 1, students were directed to analyze the level of HOTS-based questions in elementary school science learning. In activity 2 students were directed to compile HOTS-based questions that could be applied in science learning in elementary schools.

**Kegiatan 1.**  
Berikut ini disajikan beberapa pertanyaan berdasarkan Taksonomi Bloom. Sebutkan, apakah pertanyaan tersebut termasuk kategori pertanyaan ingatan (C1), pemahaman (C2), penerapan (C3), analisis (C4), evaluasi (C5), atau kreasi (C6)!

.....  
.....

**Kegiatan 2.**  
Tuliskan masing-masing satu contoh pertanyaan dalam pembelajaran IPA SD yang termasuk kategori pertanyaan ingatan (C1), pemahaman (C2), penerapan (C3), analisis (C4), evaluasi (C5), dan kreasi (C6)!

Figure 6. HOTS-based Activities in LKM 7

### Learning Implementation in the Course of Elementary Science Learning Development to Integrate Students' High Order Thinking Skills

Online-based learning activities are recorded in the learning management system (LMS) platform used, namely sipedar.ustjogja.ac.id. The use of a learning management system (LMS) is needed so that learning is more focused. The composition of the LMS for Elementary School Science Learning Development classes on each meeting topic consists of parts, namely: Attendance, Teaching Materials, Group Discussions, Class Discussions, and Assignments. Students discuss LKM assignments so that discussion activities also focus on higher-order thinking skills.

Figure 7. LMS Elementary School Science Learning Development Course

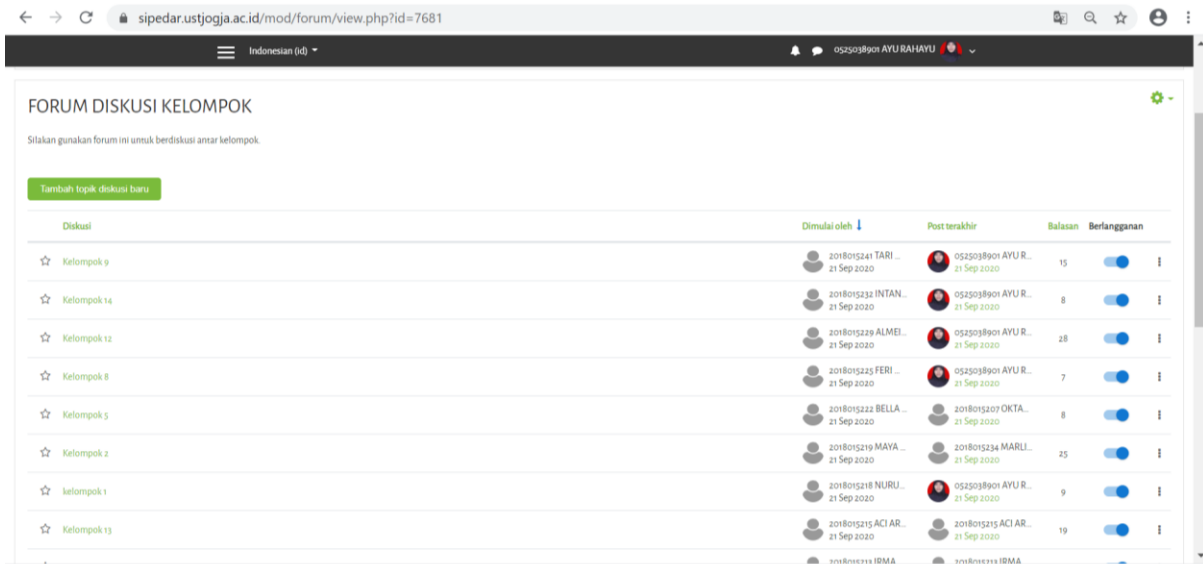


Figure 8. The group discussion section in LMS

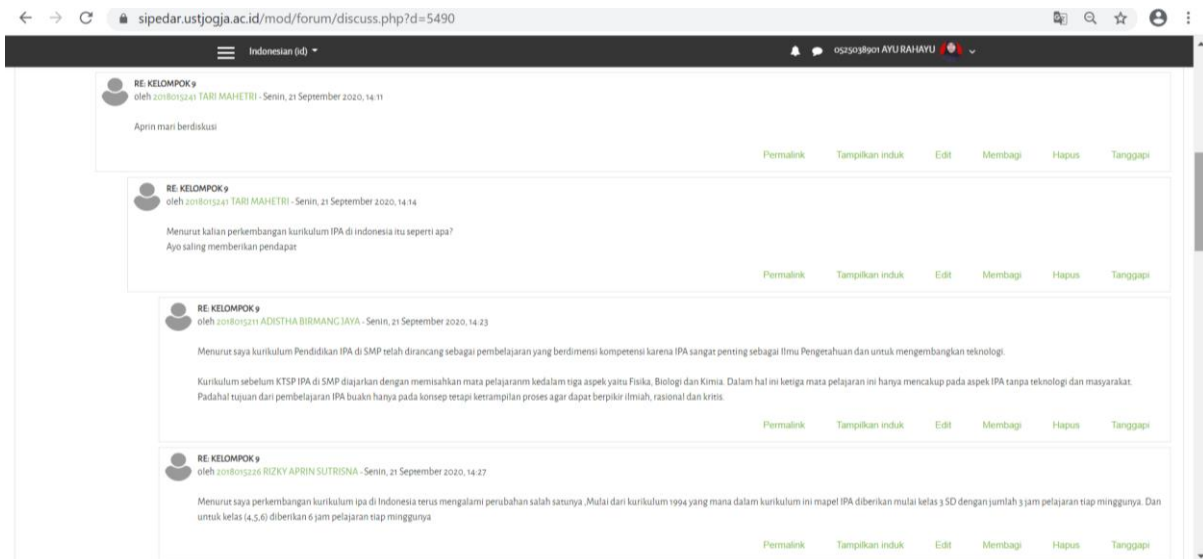


Figure 9. Example of group discussion at LMS

### Learning Asessment in the Course of Elementary Science Learning Development to Integrate Students' High Order Thinking Skills

Examples of learning assessments to integrate higher-order thinking skills are seen in the expected outcomes, C4, C5, and or C6. The midterm examination (UTS) shows that the expected achievement is at level C6, namely the ability to create. Students are expected to be able to compile learning scenarios according to certain characteristics.

**B. Pertanyaan**

Tuliskan rancangan pembelajaran IPA (berdasarkan kurikulum 2013) berbasis daring sesuai hakikat IPA dan pembelajaran IPA. Rancangan pembelajaran perlu mengintegrasikan keterampilan berpikir tingkat tinggi (*high order thinking skills/HOTS*) sesuai dengan model pembelajaran yang dipilih. Berdasarkan KI dan KD yang ada, buatlah:

1. Indikator Pencapaian Kompetensi (IPK) (*skor: 20*)
2. Tujuan pembelajaran (*skor: 20*)
3. Skenario Pembelajaran IPA (kegiatan pendahuluan, kegiatan inti, dan penutup) (*skor: 50*)
4. Sumber Belajar dan Media (*skor: 10*)

Figure 10. Assessment of learning in the form of Midterm Examination

## Conclusion

The integration of high-order thinking skills (HOTS) of students in the online-based Elementary School Science Learning Development course at Universitas Sarjanawiyata Tamansiswa is observed in three aspect learnings: planning, implementation, and assessment. In the learning plan, educators compile the semester lesson plan (RPS) and student worksheets (LKM). In the RPS, the integration of HOTS can be seen in several aspects: course learning outcomes, course descriptions, expected final abilities, and student learning experiences. The expected course learning achievement and final ability using operational verbs at levels C4, C5, and / or C6. The application of HOTS in the course descriptions and student learning experiences can be seen in the internalization of Ki Hadjar Dewantara's principles, *niteni, nirokke, and nambahi*. In LKM, the integration of HOTS is raised in the activities that exist at each meeting. In the learning assessment, it is shown that the learning outcomes lies in HOTS level C6 (creating), namely students are able to compile learning scenarios according to the nature of science and elementary school science learning.

## Recommendations

The high-order thinking skills of students in the online-based Elementary School Science Learning Development course at Universitas Sarjanawiyata Tamansiswa can be implanted in other subjects in various ways.

## Acknowledgements or Notes

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## References

- Anderson, L. W. & Krathwohl, D.R. (2001). *A taxonomy for learning, teaching, and assessing*. New York: Longman.
- Andriyani, R., & Saputra, N. N. (2020). Optimalisasi Kemampuan Higher Order Thinking Skills Mahasiswa Semester Awal melalui Penggunaan Bahan Ajar Berbasis Berpikir Kritis. *Al-Khwarizmi: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam*, 8(1), 77-86.
- Aqib, Z. & Rohmanto, E. (2008). *Membangun profesionalisme guru dan pengawas*. Bandung: Yrama Widya.
- Direktorat Jenderal Pendidikan Tinggi. (2020). *Buku Panduan Penyelenggaraan Pembelajaran Semester Gasal 2020/2021 di Perguruan Tinggi*. Jakarta: Direktorat Jenderal Pendidikan Tinggi Kemdikbud RI.
- Knowles, M. (1997). *The Modern Practice of Adult Education Andragogyversus Paedagogy*. New York: Association Press.
- Sujarwo. (2016). *Pendidikan Orang Dewasa*. Disampaikan dalam Diklat Pekerti untuk Dosen UNY.
- Tawil, M. & Liliasari. (2013). *Berpikir Kompleks dan Implementasinya dalam Pembelajaran IPA*. Makasar, Badan Penerbit UNM.
- Tim Kurikulum dan Pembelajaran. (2014.) *Buku Kurikulum Pendidikan Tinggi*. Jakarta: Direktorat Pembelajaran dan Kemahasiswaan Dirjen Dikti Kemdikbud.



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