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ARTIFICIAL INTELLIGENCE TOOLS AS CORRELATE OF THE IMPLEMENTATION OF ECONOMICS OF EDUCATION CURRICULUM IN PUBLIC TERTIARY INSTITUTIONS IN ANAMBRA STATE

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Abstract

This study investigated Artificial Intelligence tools as correlate of the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State, Nigeria. To guide the study, two research questions were raised and two hypotheses were formulated and tested at 0.05 level of significance. The study adopted a correlational research design involving simple linear method. The population of the study is 2,657 lecturers from 9 tertiary institutions in Anambra State. A sample of 133 Economics of Education lecturers from 5 selected tertiary institutions offering Economics of Education in the study area was determined through Taro Yamane formula using purposive sampling technique. The research instruments used were two rating scales titled: Artificial Intelligence Tools Scale (AITS) and Implementation of Economics of Education Curriculum Scale (IEECS) which contained 20 items and 10 items respectively. The instruments were validated by five research experts. Reliability coefficients of 0.88 for AITS and 0.83 for IEECS were obtained using Cronbach Alpha statistics. Pearson Product Moment Correlation Coefficient (PPMCC) was used to answer the research questions while the hypotheses were tested using t-test of the significance of Pearson "r" statistics. The result revealed that intelligent tutoring systems and chatbots as AI tools have substantial and positive significant coefficient of relationship with the implementation of Economics of Education curriculum in tertiary

institutions in Anambra State. It was concluded that institutions and lecturers who leverage on intelligent tutoring systems and chatbots can optimize curriculum delivery, reduce workload, and focus on high-impact teaching activities. It was recommended amongst others that intelligent tutoring system as AI tool has a substantial and positive significant coefficient of relationship with the implementation of Economics of Education curriculum in tertiary institutions in Anambra State.

Keywords: Artificial Intelligence tools (AI), Chatbots, Curriculum implementation, Economics of Education, and Intelligent tutoring system.

Introduction

Tertiary education institutions refer to post-secondary education providers that offer advanced education and training beyond the secondary school level, including universities, polytechnics, and colleges of education. They are also known as higher education institutions that provide specialized training and education in various fields, such as arts, sciences, technology, and vocational studies, leading to the award of certificates, diplomas, and degrees. Tertiary education institutions in Nigeria are advanced education and training providers that offer a range of programs, including undergraduate and postgraduate studies, professional certifications, and vocational training, aimed at developing skilled professionals and contributing to national development. The aims and objectives of tertiary education institutions in Nigeria according to Federal Republic of Nigeria (2013), include providing advanced knowledge and skills to students, fostering intellectual growth and development, and equipping graduates with the competencies needed for the workforce. These institutions also aim to promote research, innovation, and community service, contributing to national development and global competitiveness. By doing so, they seek to produce well-rounded, critically thinking, and professionally equipped individuals who can drive economic growth and social progress. However, there are various courses that are offered in the tertiary education institutions that can drive home economic growth and social progress and one of them is the Economics of Education.

Economics of Education is the study of how resources are allocated and utilized in the education sector, examining the economic implications of educational decisions and policies. It analyzes the economic benefits and costs of education, including its impact on individual earnings, economic growth, and societal development. According to Niyi and Musa (2020), Economics of Education evaluates the efficiency and effectiveness of educational systems, institutions, and policies, considering factors like resource allocation, funding, and outcomes to optimize educational investments. Studying Economics of Education in tertiary institutions aims to equip students with a deep understanding of the economic principles and concepts that govern the education sector. The objectives include analyzing the economic benefits and costs of education, evaluating the efficiency and effectiveness of educational systems, and informing policy decisions that optimize educational investments (Federal Ministry of Education, 2019). Students learn to apply economic theories and methods to real-world educational issues, developing critical thinking and problem-solving skills. The study of Economics of Education allows the learners contribute towards improving educational outcomes, resource allocation, and economic development, hence the need for its effective implementation.

Curriculum implementation refers to the process of putting curriculum plans and designs into practice, where educators deliver the intended learning experiences to students. It involves translating curriculum designs and plans into actual classroom practices, ensuring that learning objectives are achieved and students acquire the intended knowledge, skills, and attitudes. Curriculum implementation according to Nwiyi (2019) is the execution of planned educational experiences, where teachers, administrators, and other stakeholders work together to deliver the curriculum, monitor student progress, and make adjustments as needed to achieve learning goals. Implementation of Economics of education curriculum refers to the integration of economic principles, concepts, and theories into the delivery of educational curricula, enabling students to understand the economic aspects of education and its impact on society. It

involves applying economic analysis to the planning, development, and delivery of educational curricula, ensuring that resources are allocated efficiently and effectively to achieve learning objectives and promote economic development (Olofu, 2023). Economics of education curriculum implementation is important because it helps lecturers and policymakers make informed decisions about resource allocation, ensuring that educational programs are efficient and effective. The integration of economic principles into curriculum planning will allow lecturers to optimize learning outcomes, promote economic development, and enhance students' economic literacy. This approach also enables students to understand the economic implications of education and make informed choices about their own educational investments. However, owing to the paradigm shift in the educational system, it becomes imperative to integrate Artificial Intelligence for the implementation of Economics of Education.

Artificial Intelligence (AI) is the application of sophisticated technology, namely machine learning algorithms and computational models, to enhance the learning process, boost educational results, and customise instruction to meet the unique requirements of each student. It comprises a diverse array of applications, such as intelligent tutoring systems, adaptive learning platforms, and virtual simulations. These technologies have the objective of examining students' learning habits, offering individualised feedback, and generating dynamic educational experiences. AI according to Okunade (2024) encompasses the use of diverse techniques including natural language processing, computer vision, and data analytics to provide a dynamic and adaptable learning environment. It surpasses conventional teaching techniques by utilising computing power to adjust to the individual strengths and limitations of students, promoting a more customised and efficient educational experience that allows students to participate in the teaching and learning process. Artificial intelligence refers to the development of computer systems that can perform tasks that typically require human intelligence, such as learning, problem-solving, and decision-making. Artificial intelligence tools according to Alowooja and Ajibola

(2025) can enhance the learning experience by providing personalized instruction, automating administrative tasks, and offering real-time feedback. AI-powered tools can also help teachers identify knowledge gaps, tailor lessons to individual students' needs, and improve student outcomes. With AI tools, schools can create a more efficient, effective, and adaptive education system that supports student success.

Artificial intelligence tools are innovative technical framework that encompasses the creation of computer systems with the ability to execute activities that usually need human intellect. In the context of this study, AI tools help to facilitate personalized learning experiences, adaptive assessments, and real-time feedback, enabling teachers to tailor instruction to individual students' needs. AI-powered tools can also automate grading, freeing up instructors to focus on high-touch, high-value tasks. In the same vein, Ogbebor and Osagiede (2024) assert that AI-driven tools can provide virtual learning support, offer interactive simulations, and enhance student engagement. Numerous AI-based tools have been developed to cater to the unique needs of teaching and learning in the academic setting. These tools harness advanced algorithms and data processing capabilities to streamline tasks, offer personalized learning experiences, and provide valuable insights for research endeavours and instructional delivery. Ukeh and Anih (2024) assert that the artificial intelligence platforms for teaching and learning include; Intelligent Tutoring Systems (ITS), Adaptive Learning Platforms (ALP), Virtual Reality (VR), Chatbots and Virtual Assistants, Natural Language Processing (NLP), Intelligent Content Creation Tools, learning management system as well as Speech Recognition, Language Learning among others. Similarly, Judging from the foregoing, this study focuses on the use of intelligent tutoring systems and chatbots in the implementation of Economics of Education curriculum in tertiary institutions.

Intelligent Tutoring Systems (ITS) can be defined as a groundbreaking evolution in educational technology, merging the fields of artificial intelligence and pedagogy to create personalized learning

experiences. Unlike traditional educational approaches that often adopt a one-size-fits-all methodology, intelligent tutoring systems are designed to adapt to the unique learning styles, paces, and needs of individual students. Ukeh and Anih (2024) assert that intelligent tutoring systems refer to a system used to assess a learner's strengths and weaknesses in real-time, offering tailored feedback and resources that enhance understanding and retention. Intelligent Tutoring Systems (ITSs), according to Okafor and Anyanwu (2025) are computer-based instruction systems using artificial intelligence methods in presenting students with opportunities for self-directed and individualized learning through intelligent guidance and help. Intelligent tutoring systems (ITS) provide personalized instruction and real-time feedbacks to students, helping them learn at their own pace and fill knowledge gaps. Empirically, Afusat and Opara (2024) investigated the impact of AI-Powered personalized learning platforms on the academic achievement and motivation of computer science senior secondary school students in Abuja Municipal Area Council (AMAC) FCT-Abuja, Nigeria found that AI-powered platforms significantly improved the academic achievement of secondary school students compared to traditional learning methods which positively impact on the motivation of secondary school students. Similarly, Alrakhawi, Jamiat and Abu-Naser (2023) who examined intelligent tutoring systems in education: a systematic review of usage, tools, effects and evaluation found that ITSs provide adaptive guidance and training, assess learners, establish and update the learner's model, and categorize or cluster learners.

Chatbots refer to artificial intelligence (AI) tool designed to simulate human conversation through text or voice interactions. They can be integrated into various platforms, such as websites, mobile apps, or messaging services, making them accessible and user-friendly. Aina, Gbenga-Epebinu, Olofinbiyi, Ogidan and Ayedun (2023) opine that chatbots refer to innovative solutions to teaching and learning processes which rely on Natural Language Processing (NLP), a subset of AI that enables them to understand and interpret human language. For students, they can act as virtual tutors, offering instant

answers to homework questions, providing explanations for complex concepts, and even guiding learners through interactive quizzes or exercises. For lecturers, chatbots can streamline administrative tasks, such as answering common inquiries about course materials or scheduling, thus freeing up valuable time for teaching and mentorship. In a related study, Ajibola (2025) who investigated integrating artificial intelligence chatbots and virtual tutors to support independent learning among NCE 3 students found that students supported by AI tools demonstrated greater content retention, engagement, and digital literacy. This study affirms that AI virtual assistants can significantly complement pedagogical delivery and foster autonomous learning skills in teacher trainees. In another related study, Afonughe, Onah, Uzoma, Andor and Orisakwe (2021) who investigated the integration of AI-chatbot into teaching and learning among public universities students in South-South (Delta state, Edo State and Bayelsa) found that there is no significant difference in the mean rating of respondents on the need for AI-chatbot in teaching and learning as well as performing administrative tasks among universities in South-South; there is little availability of AI-chatbot technology in handling universities` administrative duties; and, the findings shows that poor internet facilities, instabilities in governance, inadequate funding, poor electricity supply among others are factors inhibiting implementation of AI-chatbot towards administrative duties among the universities.

Artificial Intelligence tools offer promising avenues for enhancing educational outcomes. These tools can adapt to individual learning styles and pace, providing tailored instruction that addresses specific gaps in understanding. Furthermore, AI tools can supplement traditional teaching methods by offering interactive and gamified learning experiences that make complex concepts more accessible. However, the studies conducted on Artificial Intelligence tools focused on its impact on teaching and learning, students' learning outcomes and academic performance in Mathematics, CRS, English Language, Physics, Computer Science and Technical Vocational Education (Okunade, 2024; Alowooja & Ajibola,

2025; Ogbebor & Osagiede, 2024; Ukeh & Anih, 2024; Ajibola, 2024; Ajibola, 2025; Afonughe, Onah, Uzoma, Andor & Orisakwe, 2021) without any study on the implementation of Economics of Education curriculum. There is therefore an urgent need to bridge this gap by exploring Artificial Intelligence tools as correlate of the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State, Nigeria.

Statement of the Problem

The rapid integration of technology in education, particularly the emergence of artificial intelligence tools has significantly altered the landscape of educational system. While these tools offer potential benefits in improving students' learning outcomes, their impact on the learning process and the implementation of Economics of Education curriculum remains largely unexplored. In most tertiary institutions in Anambra State where Economics of Education is a significant part of the curriculum, there is a pressing need to understand how intelligent tutoring systems and chatbots influence students' comprehension of Economics of Education concepts and its overall implementation. The problem is further compounded by the unique nature of Economics of Education which requires factual knowledge, critical thinking, interpretation, and the ability to articulate complex economic values and ideas. The use of intelligent tutoring systems and chatbots as artificial intelligence tools in the implementation of Economics of Education curriculum in this context raises questions about the authenticity of student work, the development of essential writing and analytical skills, and the potential over-reliance on technology in a field that traditionally emphasizes personal reflection and interpretation. This research is therefore put in question form; what is the relationship between AI tools and the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State? Providing answer to the posed question becomes the thrust of this study.

Research Questions

The following research questions were raised to guide the study:

1. What is the coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State?

2. What is the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

Ho_1: The coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State is not significant.

Ho_2: There is no significant coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State.

Methods

The study adopted a correlational research design involving simple linear method. The use of correlational design aided the researcher towards understanding the relationship existing between one variable and another variable of a study. The population of the study is 2,657 lecturers from 9 tertiary institutions in Anambra State. Taro Yamane formula was used to determine a sample of 133 Economics of Education lecturers from 5 selected tertiary institutions offering Economics of Education in the study

area using purposive sampling technique. By using purposive sampling, the researchers aimed to capture the perspectives and experiences of lecturers who specialize in Economics of Education, thereby gaining rich and insightful data that addresses the research objectives. The research instruments used were two rating scales titled: Artificial Intelligence Tools Scale (AITS) and Implementation of Economics of Education Curriculum Scale (IEECS). AITS contained 20 items while IEECS had 10 items developed by the researcher from clues in the literature and personal experiences. The items on the rating scale had the 4-point scale of Strongly Agree (SA) - 4 points, Agree (A) - 3 points, Disagree (D) - 2 points and Strongly Disagree (SD) - 1 point. The instruments were validated by three research experts in Department of Educational Management and Policy and two research experts in the Field of Education Measurement and Evaluation, all in the Faculty of Education, Nnamdi Azikiwe University, Awka. Reliability coefficients of 0.88 for AITS and 0.83 for IEECS were obtained using Cronbach Alpha statistics. The researcher with the aid of three enlightened research assistants administered the instrument to the respondents who represented the sample of the study. Pearson Product Moment Correlation Coefficient (PPMCC) was used to answer the research questions while the hypotheses were tested using t-test of the significance of Pearson "r" statistics at a 0.05 level of significance.

Result

Research Question One: What is the coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State?

Table 1: Summaries of Pearson "r" statistics used to explain the coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum

V	n	∑	r	r^2	DR	Remarks
X	133	4734				**Substantial**
			0.65	42.25%	Positive	**Positive**
Y	133	6986				**Relationship**

Size (n), Summation (∑), Pearson (r), Proportion of Variance (r^2), Direction of Relationship (DR) and Remarks

Data in Table 1, presents the summaries of Pearson "r" statistics used to explain the coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum. The analysis reveals a substantial positive relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum indicating that as the potency of intelligent tutoring systems increases, the likelihood of implementation of Economics of Education curriculum also increases. Specifically, the coefficient value of 0.65 suggests that approximately 42.25% (r^2 = 0.4225) of the variation in the implementation of Economics of Education curriculum can be attributed to the use of intelligent tutoring systems, highlighting the significant impact of intelligent tutoring systems as AI tool on the implementation of Economics of Education curriculum among the 133 sampled Economics of Education lecturers. Therefore, the answer to the above question reveals a substantial positive relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State.

Hypothesis One

Ho_1: The coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State is not significant.

Table 2: Summaries of t-test of significance of Pearson "r" statistics used to test the coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum

V	n	∑	r	α	df	t_{cal}	t_{tab}	Decision
X	133	4734						
			0.65	0.05	131	**11.865**	**1.96**	**Reject Ho_3**
Y	133	6986						

Sample Size (n), Summation (∑), Pearson (r), Alpha Level (α), Degree of Freedom (df) and t-test of Significance of Pearson 'r" statistics between two Variables

Table 2 shows the result for the test of the coefficient of relationship between intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State. The null hypothesis, which states that the coefficient of relationship between

intelligent tutoring systems as AI tool and the implementation of Economics of Education curriculum is not significant, can be rejected. The calculated t-value (11.865) exceeds the critical t-value (1.96), indicating a statistically significant relationship at the 0.05 level with 131 degrees of freedom. However, the correlation coefficient (0.65) suggests a strong positive relationship, implying that intelligent tutoring systems as AI tool has a significantly huge coefficient of relationship with the implementation of Economics of Education curriculum in tertiary institutions in Anambra State.

Research Question Two: What is the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State?

Table 3: Summaries of Pearson "r" statistics used to explain the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum

V	n	∑	r	r^2	DR	Remarks
X	133	4705				**Substantial**
			0.69	47.61%	Positive	**Positive**
Y	133	6986				**Relationship**

Size (n), Summation (∑), Pearson (r), Proportion of Variance (r^2), Direction of Relationship (DR) and Remarks

In Table 3, the data presents the summaries of Pearson "r" statistics used to explain the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum. The analysis reveals a substantial positive relationship between chatbots as AI tool and the implementation of Economics of Education curriculum indicating that as the efficacy of chatbots increases, the likelihood of implementation of Economics of Education curriculum also increases. Specifically, the coefficient value of 0.69 suggests that approximately 47.61% (r^2 = 0.4761) of the variation in the implementation of Economics of Education curriculum can be attributed to the use of chatbots, highlighting the significant impact of chatbots as AI tool on the implementation of Economics of Education curriculum among the 133 sampled Economics of Education lecturers. Therefore, the answer to the above question reveals a substantial positive relationship between chatbots as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State.

Hypothesis Two

Ho_2: There is no significant coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State.

Table 4: Summaries of t-test of significance of Pearson "r" statistics used to test the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum

V	n	∑	r	α	df	t_{cal}	t_{tab}	Decision
X	133	4705						
			0.69	0.05	131	**12.922**	**1.96**	**Reject Ho_4**
Y	133	6986						

Sample Size (n), Summation (∑), Pearson (r), Alpha Level (α), Degree of Freedom (df) and t-test of Significance of Pearson 'r" statistics between two Variables

In Table 4, the data shows the result for the test of the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum in tertiary institutions in Anambra State. The null hypothesis, which states that the coefficient of relationship between chatbots as AI tool and the implementation of Economics of Education curriculum is not significant, can be rejected. The calculated t-value (12.922) exceeds the critical t-value (1.96), indicating a statistically significant relationship at the 0.05 level with 131 degrees of freedom. However, the correlation coefficient (0.69) suggests a strong positive relationship, implying that chatbots as AI tool has a significantly huge coefficient of relationship with the implementation of Economics of Education curriculum in tertiary institutions in Anambra State.

Discussion of Findings

The result revealed that intelligent tutoring systems as AI tool has a substantial and positive significant coefficient of relationship with the implementation of Economics of Education curriculum in tertiary institutions in Anambra State. The recorded substantial and positive significant coefficient of relationship is a proof that the use of intelligent tutoring systems can substantially influence the effective delivery and implementation of Economics of Education curriculum. The significant relationship implies that leveraging intelligent tutoring systems can be a crucial factor in enhancing the quality of Economics

of Education curriculum implementation in tertiary institutions in Anambra State. Corroborating the result, Afusat and Opara (2024) found that AI-powered platforms significantly improved the academic achievement of students compared to traditional learning methods which positively impact on the motivation of students. Similarly, Alrakhawi, Jamiat and Abu-Naser (2023) found that ITSs provide adaptive guidance and training, assess learners, establish and update the learner's model, and categorize or cluster learners. The result strengthened the fact that the use of intelligent tutoring systems as an AI tool has a profoundly positive impact on the implementation of Economics of Education curriculum in tertiary institutions in Anambra State, enhancing the learning experience and outcomes for students. This is so because the provision of personalized instruction and real-time feedback through intelligent tutoring systems help lecturers deliver the curriculum more effectively, catering to diverse learning needs and styles. This leads to improved student engagement, understanding, and retention of Economics of Education concepts, ultimately enriching the overall quality of tertiary education institutions in Anambra State.

The result also revealed that chatbots as AI tool has a substantial and positive significant coefficient of relationship with the implementation of Economics of Education curriculum in tertiary institutions in Anambra State. This result is a proof that the effective integration of chatbots can enhance the delivery of Economics of Education curriculum, likely through improved student support, instant feedback, and increased accessibility to learning resources. The substantial coefficient implies that chatbots can be a valuable asset in optimizing curriculum implementation and promoting student success. Supporting this finding, Ajibola (2025) found that students supported by AI tools demonstrated greater content retention, engagement, and digital literacy. This study affirms that AI virtual assistants can significantly complement pedagogical delivery and foster autonomous learning skills in teacher trainees. Also, Afonughe, Onah, Uzoma, Andor and Orisakwe (2021) found that there is no significant difference in the

mean rating of respondents on the need for AI-chatbot in teaching and learning as well as performing administrative tasks among universities. The result was strengthened with the fact that the integration of chatbots as an AI tool has a transformative impact on the implementation of Economics of Education curriculum in tertiary institutions in Anambra State, providing students with instant support and feedback. Chatbots enhance student engagement, facilitate access to learning resources, and offer personalized assistance, leading to improved understanding and retention of Economics of Education concepts. By leveraging chatbots, lecturers can optimize curriculum delivery, reduce workload, and focus on high-impact teaching and mentoring activities.

Conclusion

In conclusion, Artificial Intelligence (AI) tools play a pivotal role in enhancing the implementation of Economics of Education curriculum in public tertiary institutions in Anambra State, Nigeria. These AI tools offer personalized learning experiences, real-time feedback, and increased accessibility to learning resources, thereby improving student engagement and outcomes. The study underscores the potential of AI in revolutionizing teaching and learning processes in tertiary education. Institutions and lecturers who leverage on intelligent tutoring systems and chatbots can optimize curriculum delivery, reduce workload, and focus on high-impact teaching activities. Ultimately, the strategic adoption of AI tools can position Anambra State's tertiary education sector at the forefront of innovation and academic excellence across the globe.

Recommendations

Based on the findings of the study, the researchers made the following recommendations:

1. Tertiary institutions in Anambra State should integrate intelligent tutoring systems into their Economics of Education curriculum delivery, providing training and support for lecturers to effectively utilize this AI tool and enhance student learning outcomes.

2. Tertiary institutions in Anambra State should develop and deploy chatbots as a complementary tool to support Economics of Education curriculum implementation, providing students with instant feedback, guidance, and access to learning resources, while also reducing lecturer workload and enhancing overall learning experience.

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