Leveraging Artificial Intelligence to Enhance Social Justice, Equity and Inclusive Education: A Comprehensive Study

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Abstract

God is Great and whatever his hillarious creations on the Earth are somehow purposeful. All are equal for him but in society the rules for the people are unequal. So, to bring that awareness for inclusion around the world is also necessary. It said that some people are very special for God and so those are called Special Children. Just like that there are some disabled children, too. These kinds of children like special and disabled children have equal rights to study with the general classroom and for the ease of life Artificial Intelligence play a vital role. Artificial Intelligence has ushered in transformative changes, championing inclusion and accessibility for individuals with disabilities. This paper shows solutions by Artificial Intelligence. There are some assistance technologies including a variety of Artificial Intelligence driven support system. Like, speech recognition for communication, mobility assistance for independent movement, cognitive autonomy. So, we can say that education and science both are the two sides of a coin. Here, we will talk about the Artificial Intelligence disability inclusion model and where there is a facility, these are some challenges too. Artificial Intelligence has the power to significantly enhance the overall quality of life for individuals with disabilities across a spectrum of vital areas.

Keywords: Social Justice, Equity, Artificial Intelligence and Inclusive Education, Special and Disabled Children

Introduction

In recent years, Artificial Intelligence (AI) has emerged as a transformative force across various sectors, reshaping industries and redefining the possibilities of technological innovation. Education as a cornerstone of societal development, is one of the fields experiencing significant impacts from AI advancements. This comprehensive study explores the intersection of AI and

education, specifically focusing on how AI can be leveraged to promote social justice, equity and inclusivity within educational systems.

The importance of social justice, equity and inclusive education can not be overstated. These principles ensure that all individuals, regardless of their socio - economic background, race, gender or abilities, have access to succeed. Traditional educational frameworks have often struggled to address the diverse needs of students, leading to systematic inequalities and barriers to learning. However, AI presents a unique opportunity to bridge these gaps, offering innovative solutions to long-standing challenges.

This study examines the potential of AI to enhance educational equity by providing personalized learning experiences, improving access to educational resources and enabling data-driven decision making. By tailoring educational content to individual learning styles and needs. AI can help ensure that all students receive the support they require to thrive. Furthermore, AI driven tools can facilitate the identification and mitigation of biases in educational materials and practices, fostering a more inclusive environment.

The application of AI in education also raises important ethical and practical considerations. It is crucial to address issues such as data privacy, algorithmic bias, and the digital divide to ensure that AI's benefits are equitably distributed. This study delves into these challenges, offering insights and recommendations for policy makers, educators and technologists to navigate the complexities of integrating AI in educational contexts.

In summary, this comprehensive study aims to illuminate the potential of AI to transform education into a more just, equitable and inclusive domain. By harnessing the power of AI, we can create educational systems that not only adapt to the diverse needs of students but also actively work towards eliminating the disparities that hinder progress. This introduction sets the stage for an in-depth exploration of the strategies, opportunities and challenges involved in leveraging AI for the advancement of social justice, equity and inclusive education.

Objectives of The Study

Objective of this study is to identify disparities in educational resources, opportunities and outcomes across different demographic groups. It develops AI driven personalized learning systems that cater to the diverse needs of students, ensuring equitable access to quality education. It designs AI

algorithms to minimize bias in educational assessments, admission processes, and resource allocation, promoting fairness and inclusivity. Utilization of AI is to optimize the distribution of educational resources, ensure that undeserved and marginalized communities receive adequate support. For early identification of students at risk of falling behind, enabling timely interventions and support to improve their academic outcomes. Ai driven tools to assist teachers in identifying and addressing the unique needs of their students, enhancing their ability to provide equitable education. It continuously monitor and evaluate the effectiveness of educational programs and policies, ensuring they align with the goals of social justice and equity. Such AI tools facilitate better communication and collaboration between schools, families and communities fostering an inclusive educational environment. This support the development of data - driven policies that promote social justice and equity in education by providing insights and recommendations based on AI analysis. These objectives aim to harness the potential of AI to create a more equitable and inclusive educational landscape, ensuring that all students have the opportunity to succeed regardless of their background.

The Role of Technology in Education

The connection between technology and education is usually very complex and multifaceted because of the political, economic, social and pedagogical implications that the use of technology has in education. We all knew that we live in technological societies. We must use technology in teaching and learning tasks and to prepare and to prepare curriculum too. It means that development in the technology will bring drastic change in pedagogical ventures which will bring improvement in education. Use of technology in education will get advantage to the students more than the students who follow traditional method.

However, it can be argued that its not a matter of discussing education with or without technology because even a pencil and piece of paper are technologies. They are so ubiquitous in our lives that we tend to forget that they are technological devices.

The Role of Technology in Inclusive Education

The aim of an inclusive educational environment is to ensure that all students are treated fairly and get equal opportunities. Successful inclusive education primarily is accepting and understanding student differences and their physical, cognitive, academic, social and emotional diversities. It is very necessary to have a good teacher in one's life but not every child has access to one. Technology

allows increasing the independence of a particular student freeing him from the constant need for direct teacher involvement. As a result, a student can choose the speed of learning that is convenient for him which leads to more personalized learning. When a student doesn't inhibit the learning process for the whole group, it allows reducing the anxiety level which plays a vital role in education as well. Implementation of technologies in inclusive education allows simplifying the communication and improving the academic skills of students with disabilities.

Importance of Social Justice, Equity and Inclusive Education

The principles of diversity, equity and inclusion if embedded within the school education system lays the foundation for access to schooling for all, a larger population joining the workforce and opportunities for lifelong learning for all learners. The National Education Policy (NEP), 2020 emphasizes that, "Education is the single greatest tool for achieving social justice and equality" which has implications for development of an inclusive community and society at large. In order for policy to translate to practice, educational barriers, facilities and services for Children With Special Needs(CwSN) must be addressed. The NEP has infused the aspects of disability inclusion throughout the policy document with a dedicated chapter on equitable and inclusive education, focusing on issues, challenges and recommendations for bringing the gaps reducing the disparities in access and participation of all learners. The issues and recommendations for inclusion of underrepresented students' groups including children with disabilities has been subsumed in the policy and covered under the SEDGs i.e. Socio Economically Disadvantaged Groups which is an umbrella term covering gender identities, socio - cultural and socio - economic identities, geographical identities as well as disabilities.

Disabilities impact access to opportunities for learning and achievement of a learner's full potential. It is therefore imperative to design a flexible education system that caters to the individual needs and abilities of CwSN. Equitable, inclusive and quality education identifies and attempts to eliminate barriers, promotes a sense of belonging lays the foundation for success and better learning outcomes for all learners.

Social Justice in inclusive education considers equal opportunities in which all students have access to quality education regardless of socioeconomic status, race, gender or disability. Social

justice provides education that empowers marginalized communities and promotes social mobility , encouraging diverse perceptiveness and experiences in the educational environment.

Importance of Equity in Education recognizing that students have different needs and providing tailored resources and support. It helps to reduce achievement gaps like identifying and addressing factors that contribute to disparities in educational outcomes. It is promoting policies and practices that ensure all students can succeed academically.

Importance of Inclusive Education benefits all students promoting diversity and inclusivity which gives benefits to all the students by exposing them to different perspectives and fostering empathy.

The Role of AI in Education

Intelligent Environments for teaching and learning are necessary in today's modern era. The role of AI in education is helpful for the study of human teaching and some engineering systems that facilitate human learning. The field addresses questions that are long term in nature: how can systems facilitate learning and enable the measurement of learning progress(Lesgold, 1988)

The engineering side of the discipline frequently comes from the term intelligent tutoring system(ITS). Computational methods are used in support of AI activities such as planning, control, knowledge representation and acquisition, explanation, cognitive modeling and dialogue management. Alternative theories about learning can be explored and evaluated with the use of computational models. Research is motivated by the promise of building powerful teaching systems with greater knowledge about a domain, increased ability about topic selection and response generation. This entry reviews the current state of the field and discusses the history of the field. It emphasizes on the topics of building teaching systems, recent developments in the field and open research issues.

The Role of AI in Inclusive Education

Various types of disabilities exist which include many physical and mental impairments that come in the way of a person's ability to perform his/her activities. Some disabilities are like physical impairments, disability of the spinal cord, brain disability, sight disability, hearing disability, intellectual or learning disability and mental disability too.

Disability is a comprehensive word, encompassing conditions like impairments, limitations to perform certain activities and participation constraints. Difficulty in bodily function or construction is called Impairments. When a person finds difficulty to perform a task or an action then its said to have activity limitation. While when a person finds or faced the problems during normal life is called participation constraint. So, we can not say that disability is a health problem. Rather, it should be called a complex occurrence. This complex occurrence which shows the relation between features of a person's body and that of the society which he or she is a part of. To remove or to decrease these difficulties from disabled people we need to device ways for removing environmental and societal obstacles that curb their independence and growth. There is no difference between abled and disabled people but the difference is that disabled people have to face many obstacles to gain something which an abled person can do or achieve

easily.

AI technologies for Inclusive and Special Education

To overcome the difficulties of disabled students or special children there are some AI technologies which include softwares, applications and some associatives too, which are as follows:

1.   **Adaptive Learning Technology: e.g. Dreambox** - Dreambox learning is an adaptive, online K-B math program that uses AI to provide personalized instruction to students. It adjusts the difficulty and pace of math problems based on real time student performance data, offering a tailored learning experience. Dreambox continuously adjusts lesson difficulty based on student responses to provide a customized learning path. It creates unique educational journeys for each student, addressing their specific needs and learning gaps. It also incorporates game like elements to make learning fun and engaging for students. It uses visual representations and interactive manipulatives to help students understand complex math concepts. It aligns state and national math standards, ensuring that students meet grade level expectations. It provides educators with real time data on student performance, helping them make informed instructional decisions. It tracks student's progress over time, identifying areas where additional support may be needed. It provides dashboard to educators that allow teachers to monitor student progress, assign lessons, and access detailed reports. It allows students to learn at their own pace, ensuring

they fully grasp concepts before moving on.

2.   **Natural Language Processing (NLP) Tools: e.g. Grammarly -** Natural Language Processing is a branch of artificial intelligence that enables computers to understand, interpret and respond to human language. NLP tools can enhance learning by providing personalized support, improving accessibility and facilitating communication. Some key NLP tools like **Google Speech to Text** allows students to dictate their responses making it easier for those with dysgraphia or motor impairments to complete written assignments. Same as **Microsoft Azure Speech Service** provides accurate speech recognition capabilities for real time transcription and voice commands. **Kuzwelli 3000** NLP tool reads digital and printed text aloud, aiding comprehension for students with dyslexia. Natural Reader tool offers natural sounding voices to convert text to speech, making it easier for students to understand complex materials. **Grammarly** offers suggestions for grammar, punctuation and style, supporting students in producing clear and correct written work. **Monkeylearn** analyzes text for sentiment and emotion, offering insights into student's attitudes and experiences.

3.   **Speech Recognition Software**: **e.g. Dragon Naturally Speaking -** SRS technology converts spoken language into text, enabling hands free control of devices and applications. It supports students with disabilities, improve accessibility and enhance learning experiences for diverse learners. This **Dragon Naturally Speaking** tool assists students with dysgraphia, physical disabilities or learning difficulties in writing assignments and taking notes. It enhances productivity for students who struggle with typing or writing. **Google speech to text tool** helps students with motor impairments or learning disabilities to complete written tasks. **Microsoft Azure Speech Service tool** assists students in transcribing spoken content for study notes and assignments. **Apple Dictation** supports students with physical disabilities or learning difficulties to dictate essays, notes and emails. **Otter ai** used for transcribing lectures, meetings and group discussions, making them accessible to all students. It facilitates collaborative notes taking and study notes.

4.   **AI Powered Tutoring System: e.g. Knewton -** AI powered tutoring systems are intelligent educational platforms that provide personalized instruction and feedback to students, adapting to their individual learning needs and pace. **Carnegie Learning** named

tool supports students with learning disabilities by providing customized practice and remediation. It enhances understanding of mathematical concepts through interactive and engaging lessons. **Knewton** supports inclusive education by adapting instruction to meet the needs of all learners. **Aleks (Assessment And Learning In Knowledge Spaces)** supports students with learning disabilities by offering customized learning paths and frequent progress assessment. **Smart Sparrow** support diverse learners by offering personalized instruction and real time feedback.

5. **Text to Speech(TTS) and Speech to Text(STT) - e.g. Read and write by Texthelp -** TTS and STT both technologies support accessibility, personalized learning and enhanced communication for diverse learners. Example tool is of **Kurzweil 3000** assists students with dyslexia or other reading difficulties by reading text aloud, improving comprehension. **NaturalReader tool** enables students to listen to textbooks, articles and other written materials, aiding those with reading disabilities. **Read and write by Texthelp** supports students with learning disabilities by reading assignments and instructions aloud.

6. **AI- Driven Assessment Tools - e.g. - Cognii -** This AI driven assessment tools use artificial intelligence to evaluate student performance, provide personalized feedback and adapt learning base experiences based on individual needs. Like tool name **Gradescope** supports teachers in providing consistent and unbiased assessments. It helps students with learning disabilities by offering clear and detailed feedback on their work. **Querim** assists students with diverse learning needs by providing individualized assessment and support. It enhances understanding of complex subjects through personalized learning paths.

7. **Virtual Classrooms with AI Integration - e.g. Microsoft Teams -** these virtual classrooms support inclusive education by providing flexible, equitable learning opportunities that cater to diverse student needs. Example of this tool is **Google Classrooms with AI integration** supports teachers in creating personalized and accessible learning experiences for all students. **Microsoft Teams for Education** enhances inclusivity by providing tools for students with disabilities and language learners. It supports teachers with data driven insights and administrative auditorium. **Century Tech** supports diverse learners by adapting to individual needs and providing targeted support. It helps educators tailor

instruction and improve learning through data insights. **Knewton Alta** enhances student engagement and achievement through personalized learning experiences. It facilitates inclusive education by adjusting to individual learning styles and needs.

8. **Learning Analytics - e.g. - BrightBytes -** These tools support inclusive education by identifying and addressing individual learning needs, facilitating early interventions and enhancing the overall leaning experiences. One of the tool is **BrightByte** helps educators understand and address the diverse needs of their students. It supports data driven decision making to enhance teaching and learning. **CivitasLearning** facilitates early intervention strategies to support at risk students. It enhances effectiveness of inclusive education initiatives through data driven insights. **Learning Analytics Collaborative (LAC) by D2L** supports inclusive education by identifying and addressing individual student needs. It provides teachers with the data needed to tailor instruction and improve learning outcomes.

Some other important examples of technologies using for disabled students are as follows:

- ●Speech Recognition Software
- ●Gesture Recognition
- ●Eye Tracking Technology
- ●Augmented Reality (AR) and Virtual Reality (VR)
- ●Gamification and Adaptive Gaming
- ●Data Analytics for Individualized Educational Plans (IEPs)
- ●Personalized Learning Platforms

Some Features About AI Apps for Disabled Students

- ● **Voiceitt -** App using for people with **speech problems**, making communication easier. - Facilitates seamless communication for users with diverse speech patterns. - Adaptable to different languages and accents.

    - Require initial training and may face challenges with extremely rare speech disorders.

- ● **Noor Cam My Eye** - **For Visual Impaired Students**

    - Recognises and reads aloud text, identifies faces and products, color identification and money recognition

    - Supports various languages

- May have limitations in complex environments

● **Braina AI** - It offers text to **speech capabilities**, written text into spoken words, for visual impairments and reading difficulties

- Facilitates intuitive communication

- Supports text to speech functionality

- Versatile task management

● **Ava** - **Hearing Impairments**

- Speech to text in real time

- Supports multiple language

- Enhances communication in group settings

- User friendly interface

- It may face challenges in noisy environment

● **Sesame Enable** - **Facial and Gesture recognition**

- Need hands free devices like smart phones and tablets

- Gesture based commands

- It utilizes facial recognition and gestures for navigation

- Customizable sensitivity settings

- Limited to certain devices and platforms

● **Proloquo2Go** - **Visual Support for Language Development**

- Facilitates expressive communication

- Suitable for a wide range of speech and language disorder

- Symbol based communication

- Customizable vocabulary and phrases

- Visual support for language and development

And, many more like SpectrumNews, Envision AI, Waymap, Neosensory Buzz, Seeing AI, Avascribe etc

Thus, technology can be both aid and a challenge for students with disabilities. Schools and educators can take steps to ensure that these students have equitable access and those same

measures can help all the students particularly during the era of emergency remote teaching. From some findings we can conclude that students study from individuals who identified as a physical or learning disability that required accessible technologies or accommodations for their course work. Students with disabilities are literally comfortable and enjoying use of technology to improve their learning.

Some studies found that they would like to learn with the use of technology. Technology like mobile devices in the classroom, training students and faculty in using technology, multiple methods of presenting course. Lets see some images of AI tools which we can use in Classrooms or Inclusive Classrooms:

Advantages of AI tools in Inclusive Education

There is always pros and cons and these AI tools have also advantages which are given below: ●

  Customized Instruction - AI tools can adapt learning materials and activities to meet individual student needs, preferences and learning paces ensuring that each student receives the support they need to succeed.

    ●   **Adaptive Learning Paths -** These tools continuously assess student performance and adjust learning paths accordingly helping students stay engaged and progress at their own pace.

● **Targeted Feedback -** AI tools provide real time, personalized feedback, allowing students to understand their mistakes and learn from them immediately.

● **Assistive Technologies -** AI driven assistive technologies such as text to speech, speech to text and screen readers, support students with disabilities by making educational content more accessible.

● **Inclusive Learning Environment -** AI tools help create inclusive learning environments by addressing the diverse needs of students, including those with disabilities, learning difficulties and language barriers.

● **Equity in Education -** AI tools promote equity in education, ensuring that all students have an equal opportunity to succeed.

● **Efficiency and Scalability -** AI tools automate repetitive administrative tasks such as grading, attendance tracking and scheduling, freeing up teacher's time to focus on instruction and student support.

● **Data Driven Insights -** AI tools analyze vast amounts of educational data to provide insights into student performance, learning behavior and needs, helping educators make informed decisions. Its emphasis on the continuous tracking of student progress allows for the early identification of learning gaps.

● **Enhanced Engagement -** AI tools like video, simulations and gamified activities keeping students motivated.

● **Language Supporter -** AI tools can convert educational content into various formats to cater to different learning needs and preferences. AI translation and language learning tools help multilingual students and English language learners access educational materials in their preferred language.

AI tools have the potential to transform inclusive education by providing personalized, accessible and effective learning experiences for all students. Continued development and integration of AI technologies will further promote equity and inclusivity in education, ensuring that every student has the opportunity to succeed.

Disadvantages of AI tools in Inclusive Education

● **Infrastructure Challenges:** Schools in remote or economically disadvantaged areas may lack the infrastructure needed to support AI driven educational tools.

● **High Implementation Cost:** The cost of acquiring, implementing and maintaining AI tools can be prohibitive for some schools, especially those with limited budgets. There are often ongoing expenses associated with software updates, technical support and
training for educators.

● **Inherent biases and Discrimination:** AI algorithms can reflect and perpetuate biases present in the data they were trained on, leading to unfair outcomes for certain groups of students. Biased AI tools may inadvertently favor certain demographics over others potentially exacerbating existing inequalities.

● **Unequal Evaluation:** AI based assessments may not account for the diverse contexts and backgrounds of students, leading to unfair evaluations of their abilities and performance.

● **Cyber Security Threats:** The increased use of AI tools can expose educational institutions to cybersecurity threats, including data breaches and hacking. ● **Sensitive Information and Compliance Issues:** AI tools often require access to large amounts of personal data, raising concerns about th protection and privacy of student information. Schools must insure that AI tools comply with data protection regulations such as FERPA (Family Educational Rights and Privacy Act) and GDPR (General Data Protection Regulation)

● **Reduced Human Interaction and Loss of Teacher Autonomy:** Excessive reliance on AI tools can reduce the amount of human interaction and personalized attention students receive from teachers. Teachers may feel constrained by AI recommendations and data, potentially limiting their professional judgment and creativity.

● **Opaque Algorithms and Accountability:** Algorithms can be complex and opaque, making it difficult for educators and students to understand how decisions and recommendations are made. Determining accountability for decisions made by AI systems can be challenging, raising ethical concerns.

● **Implementation Challenges:** Many educators may not have the necessary training or expertise to effectively integrate AI tools into their teaching practices. Teachers and

administrators may be resistant to adopting new technologies, particularly if they are perceived as complex or disruptive.

● **Rapid Changes and Uncertain Outcomes:** The rapid pace of techno;ogical advancement can make it difficult for schools to keep up with the least AI tools and best practices. The long term impacts of AI integration in education are still uncertain and continuous evaluation and adaptation are necessary.

While AI tools offer significant potential benefits for inclusive education, it is crucial to address their disadvantages to ensure equitable, fair and effective learning experiences for all students. Continuous assessment, feedback and improvement of AI tools and their implementation strategies are essential to maximize their positive impact while mitigating any negative effects.

Impact of AI Tools on Teachers, Parents and Society

● **Impact on Teachers:** AI provides teachers with detailed insights into student performance, helping them tailor their instruction to meet individual needs. Continuous monitoring and reporting enable teachers to track student progress and adjust teaching strategies accordingly. AI tools can automate tasks such grading, attendance tracking, and lesson planning, feeling up time for teachers to focus on instruction and student support. AI can provide personalized recommendations for teacher professional development, helping educators improve their skills and effectiveness. AI driven tools can assist with classroom management by identifying areas where students may need additional support or intervention.

● **Impact on Parents:** AI systems can provide parents with regular updates on their child's progress, strengths and areas for improvement. AI powered platforms can offer information in multiple languages and formats, ensuring that all parents can stay informed about their child's education. AI tools can involve parents more directly in their child's education by providing resources, activities and suggestions for supporting learning at home. Access to detailed data and insights about their child's performance enables parents to make informed decisions and advocate effectively for their child's needs. AI can offer parents resources and guidance on supporting children with specific learning needs or disabilities. AI

driven communication tools can help bridge language barriers and ensure that all parents are engaged in their child's education.

● **Impact on Society:** AI driven educational tools can help bridge gaps in access to quality education, particularly for students in underserved or remote areas. By providing personalized support and resources. AI can help address educational disparities and promote equity. An inclusive education system supported by AI can produce a more skilled and diverse workforce, driving economic growth and innovation. AI can help reduce costs associated with personalized education and support, making it more feasible to implement inclusive practices at scale. An education system that embraces AI and inclusive practice can foster more inclusive and accepting communities. By providing equal opportunities for all students to succeed, AI in education can contribute to reducing social inequalities. Ensuring the ethical use of AI in education, particularly regarding data privacy and security, is crucial to maintaining public trust and protecting student information. Policymakers will need to develop frameworks and regulations to guid the ethical implementation of AI in education, ensuring that it benefits all students and addresses potential challenges.

Key Findings:

Some findings are on the basis of the technology experiences and needs of students with disabilities. Many disabled students are facing problems with their learning. So, they see specific technologies, assistive tools and softwares as a means of lowering those barriers. Any school or institutions and educators or faculty adoption of Universal Design For Learning (UDL) principles can serve as a lever that expands academic access for students. The UDL guidelines are a tool used in the implementation of Universal Design for Learning, a framework to improve and optimize teaching and learning for all people based on scientific insights into how human learn. The UDL guidelines can be used by educators, curriculum developers, researchers, parents and anyone else who wants to implement the UDL framework in a learning environment.

Conclusion:

Incorporating AI into education holds significant potential for advancing social justice, equity and inclusivity. By identifying disparities, personalizing learning experiences and minimizing biases. AI can help bridge the educational gaps that exist across diverse demographic groups. AI -

driven tools and platforms provide tailored support to students, enabling educators to address individual needs more effectively. Moreover, AI facilitate the creation of inclusive content and optimize resource allocation, ensuring that underserved communities receive necessary support. Continuous monitoring and evaluation through AI analytics promotes the efficacy of educational programs, fostering a more equitable learning environment. The comprehensive application of AI in education not only enhances learning outcomes but also supports the development of policies that prioritize fairness and inclusivity. As AI technology continues to evolve, its strategic implementation can transform the educational landscape, ensuring that all students have the opportunity to succeed regardless of their background. This study underscores the critical role of AI in driving systemic change towards a more just and equitable educational system.

Leveraging AI in education holds significant promise for enhancing social justice, equity and inclusivity. AI tools can identify and address disparities, personalize learning experiences, mitigate biases and optimize resource allocation. By supporting early interventions, inclusive content creation, and continuous monitoring. AI can help create an equitable educational landscape. However, ethical considerations and careful implementations are crucial to ensure that AI benefits all students and fosters a truly inclusive education system.

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