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Socially Enhanced Situation Awareness in Education Among Microblogs Using AI

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Abstract

Today, the dynamics of social media have modified people's communication; it has modified educational discourse. Social media has changed the communication methods of people in general; it has changed education- related communication. People talk about education on platforms like X, Instagram, Reddit, LinkedIn, and Facebook and these are some key places to do so. The purpose of this study to see how AI can understand people's sentiments regarding education. These methods help find out the top issues and the gaps in the issues. This will help us create better educational discussions and identify the issue that gets maximum coverage and the one ignored or missing.

It helped spread educational discussions on social media. But it does have problems like false information and distraction. Different AI approaches are recommended from the study to enhance online educational discussions. More research should focus on better models for real-time identification of false information along with automation models for trend detection in the education field for better learning.

Keywords: Social Media, Educational Awareness, Misinformation, Sentiment Analysis, Clustering, Microblogs, AI

Introduction

1.1 Background

Social media has become such a big part of day to day life that it influences the way people think and share information. A lot of users discuss education on well-known platforms including X (formerly Twitter), Instagram, Reddit, LinkedIn, Facebook, etc. People including students, teachers and researchers actively exchange knowledge share study material and online resources, and engage in brainstorming on these platforms (Perez et al., 2023). These platforms provide real time, dynamic spaces for enabling interactive discussions, instant feedback, and peer collaboration. They also facilitate the sharing of educational content like videos, articles, and other educational content, making learning more accessible, engaging, and community-driven.

Situational awareness is important to make sense of this huge amount of continuous information flow and to convert it into meaningful insights. By applying artificial intelligence (AI), particularly natural language processing (NLP) and sentiment analysis, stakeholders can monitor and infer these digital conversations. Situational awareness refers to the ability of educators, institutions, and policymakers to understand trends and sentiments related to educational needs, challenges, and developments in real time. With the huge amount of unstructured data generated on these platforms, artificial intelligence (AI) technologies—particularly natural language processing (NLP), sentiment analysis, and machine learning—have emerged as powerful tools to mine insights from microblogs. Lamsal et al. (2022) have carried out an extensive survey using AI on social media microblogs to understand situational awareness across various sectors, including education. People argue whether it helps in learning or just spreads misinformation and distractions.

1.2 Research Problem

Learning through social media is rising but it comes with major problems.

1. **Misinformation** – False or misleading educational content spreads quickly, making it hard for users to find reliable information. As people share posts without checking their facts, misinformation spreads faster than the truth (Vosoughi et al., 2018).

2. **Lack of Engagement** – Many users ignore important educational discussions. Studies research suggest as many people prefer entertainment content over educational content, it leads to low engagement in such communities.

3. **Distractions** – Social media is full of entertainment, which can make it hard to focus on learning. Students can't concentrate and their performance suffers because of multitasking on social media (Junco, 2012).

Knowing these problems can lead to creation of AI solutions which would enhance learning in social media for more engagement, accuracy and effectiveness.

1.3 Research Objectives

This study aims to:

1. Analyze the public engagement of educational topics in X, Instagram, Reddit, LinkedIn, and Facebook.

2. Conduct sentiment analysis about the public perspective on education- related discussions.

3. Identify topics that have little representation in the online educational discourse.

2 Literature Review

Social media learning has made learning easier and more enjoyable. Students, professionals and professors use social media to share information, help each other and raise questions. Having said that, there's a possibility of misinformation and distractions. There are number of studies done on how Social Media affects our education and AI can assist in categorizing topics, validating information and understanding human perspectives.

Some of the information seen over the internet is actually false. Vosoughi et al. (2018) showed us how misinformation as compared to truth travels fast. This poses a problem students could end up learning and citing incorrect information. To counter the spreading of false information, AI systems are being designed to be able to filter such leaks by directing users to the nearest or accurate source (Zhou et al., 2020).

Another major problem is the spread of misinformation, incorrect, misleading or altered content. Abdelwahab et al. (2022) suggested that the text in the posts that carry the most intense utterance of emotional language also have the most misinformation. Such post are ought to get flagged much earlier AI also has better ways in which they could produce misleading posts identification system and before the individuals trust them, it would be better for the system to first inform them (Gupta et al., 2013).

Another type of AI tool tells whether information makes use of facts or subjective (Cambria et al., 2017). This tools can help teachers and students in identifying what could be considered as correct information. One day, AI may generate better educational materials Ridley et al., 2015), after reanalysis of evidence from actual facts.

AI can be used to find out how people generally feel about education Sentiment analysis is the term used to explain how machines can understand the people who are happy, sad, or indifferent about a particular issue. Pak and Paroubek (2010) expressed how AI could read social media post and get the opinion of learners.

According to a different study by Alkhatib et al. (2018), students feel satisfied when they have free educational resources, although they can feel irritated when they have high tuition fees or heavy workloads. New AI tools like BERT and SenticNet (Cambria et al, 2017) help teachers enhance their teaching as they learn what students expect.

People are wondering about the difference between online learning and classroom learning according to the studies (Sakaki et al. 2010). Teachers can monitor students' discussions to adapt their classes to the preferences of the students (Lu et al., 2020).

Artificial intelligence will continue affecting learning. According to Zhou et al. (2020), researchers believe that AI can enhance learning resources and tailor the learning process. Also, an AI might offer study tips based on pupil's interest and developments (Gupta et al., 2013).

Researchers need to improve AI's recognition of misleading content, analyze the influence of social media on learning and ensure fairness in AI application (Zhou et al., 2020; Gupta et al., 2013). It is also important to consider the ethical implications of AI in misinformation detection. Olanipekun (2025) suggests digital literacy and fostering critical thinking to navigate this. Educators and AI leaders can work together to improve online education.

3 Methodology

3.1 Data Collection

Data was collected by means of a survey using Google forms to find out how people use social media for learning. The survey link was shared to students, teachers, professionals etc. and more than 400 responses were analyzed. The survey collected information about:

- General information: Age, education, work experience.
- Social media usage frequency
- Purpose of using social media

- Questions related to social media in the education context

3.2 AI Tools Used

There are many tools available to analyze the feedback received and produce a breakdown of what the data was saying. The following list gives details and purpose of the tools used for the present work.

- Tools like Pandas & Numpy for data preprocessing
- NLTK was used to determine if the responses were positive, negative or neutral.
- K-means clustering grouped answers that shared similar themes or topic categories.
- TextBlob was used to determine whether the response was an opinion or a fact.
- NLP was used to identify words that could be a red flags indicating misinformation or exaggeration.

3.3 Data Analysis

To further understand how people talk about education, sentiment analysis was carried out. This entailed coding a person's response, whether positive, negative, or neutral, and grouping them accordingly.

- The positive sentiment comes from people who think that social media makes learning easier and fun.
- Some people believe this website is very distracting, while others think that it spreads false information.
- Neutral people are those people who don't have any strong opinion any either.

To identify common topics that people commented on, the responses were grouped into three big themes.

- Classroom learning involves the teacher and curriculum delivering the lessons. Textbooks are easier to understand and effective.
- People who think about digital courses, learning apps and e-learning platforms are more effective.
- Distractions, misinformation, low engagement problems which people talk about education.

The patterns in how people are using social media for learning and what they worry about the most can be clearly seen from the results.

3.4 Identifying Misinformation

Given that social media is full of false/inflated information, we needed to design a method that recognizes misleading responses. This was carried out in three simple steps.

1. Checking if a response is mostly an opinion

The strength of the opinion that the response is not mostly opinion was checked using TextBlob. A score of greater than 0.5 for a response means it is mostly opinion-based and likely misleading.

2. Identifying misleading words

Some words render statements too extreme. Responses containing words like “always”, “never”, “proven false” were flagged. Some words might exaggerate a point while other words make something appear more certain than it really is.

4. Results and Discussion

4.1 Age group distribution

The survey revealed the following trends:

- Most respondents belonged to the 18-24 age group.
- 25-34s came up as the second-largest group.

The bar chart given in Figure 1 represents the distribution. It clearly indicates that the younger people are more active in educational discussions marges to social media.

The age group distribution was analyzed using:

- Use pandas to clean and organize the data.
- A bar chart was created using Matplotlib for visualization.

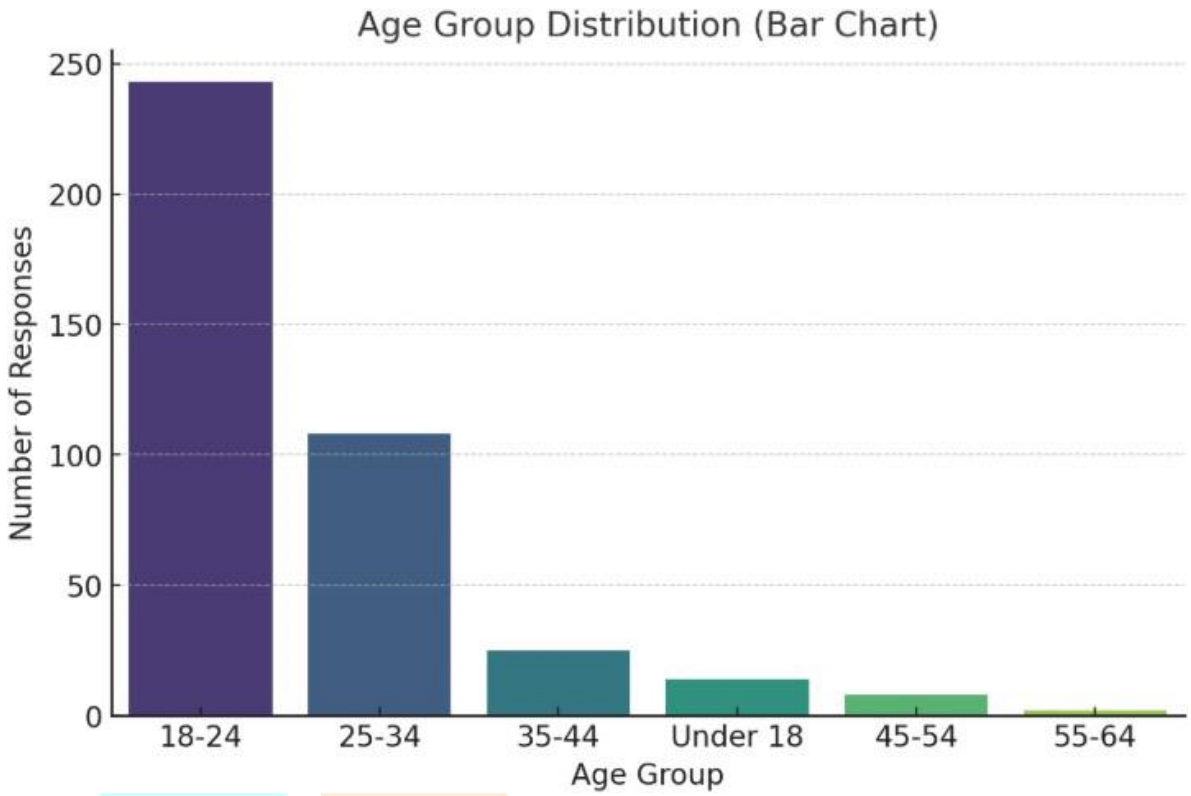

Figure 1. Age Group Distribution Chart

4.2 Popular social media platforms

The survey results in Figure 2 show the use of various social media platforms for debate on education.

- Instagram was the most used platform in our survey, followed by LinkedIn and Twitter.
- Facebook and Reddit got some good attention.

The platform usage analysis was conducted using:

- Pandas to count the mentions each platform gets.
- Seaborn and Matplotlib to create the bar chart.

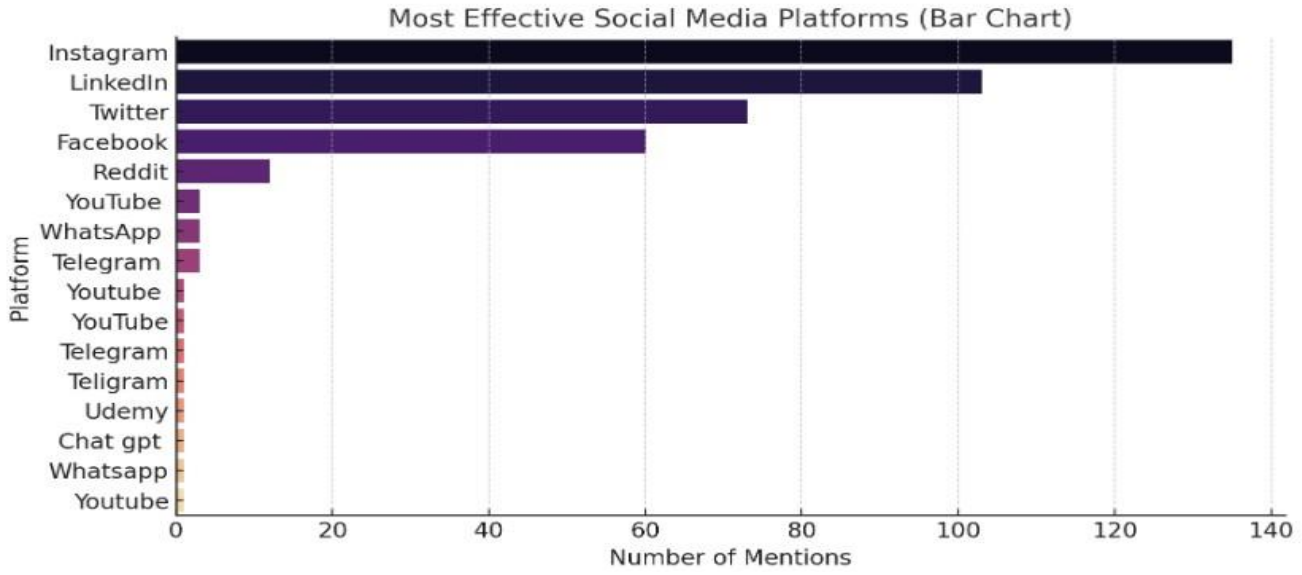

Figure 2. Social Media Platform Usage Chart

4.3 Opinion vs. Facts in Discussions

Survey results in Figure 3 indicated the factualness or opinionness of responses. The histogram shows how subjectivity scores are distributed. Most responses were found to be more opinion-oriented than fact- based. Subjectivity analysis was conducted using TextBlob to calculate subjectivity scores. (0 = fact, 1 = opinion)

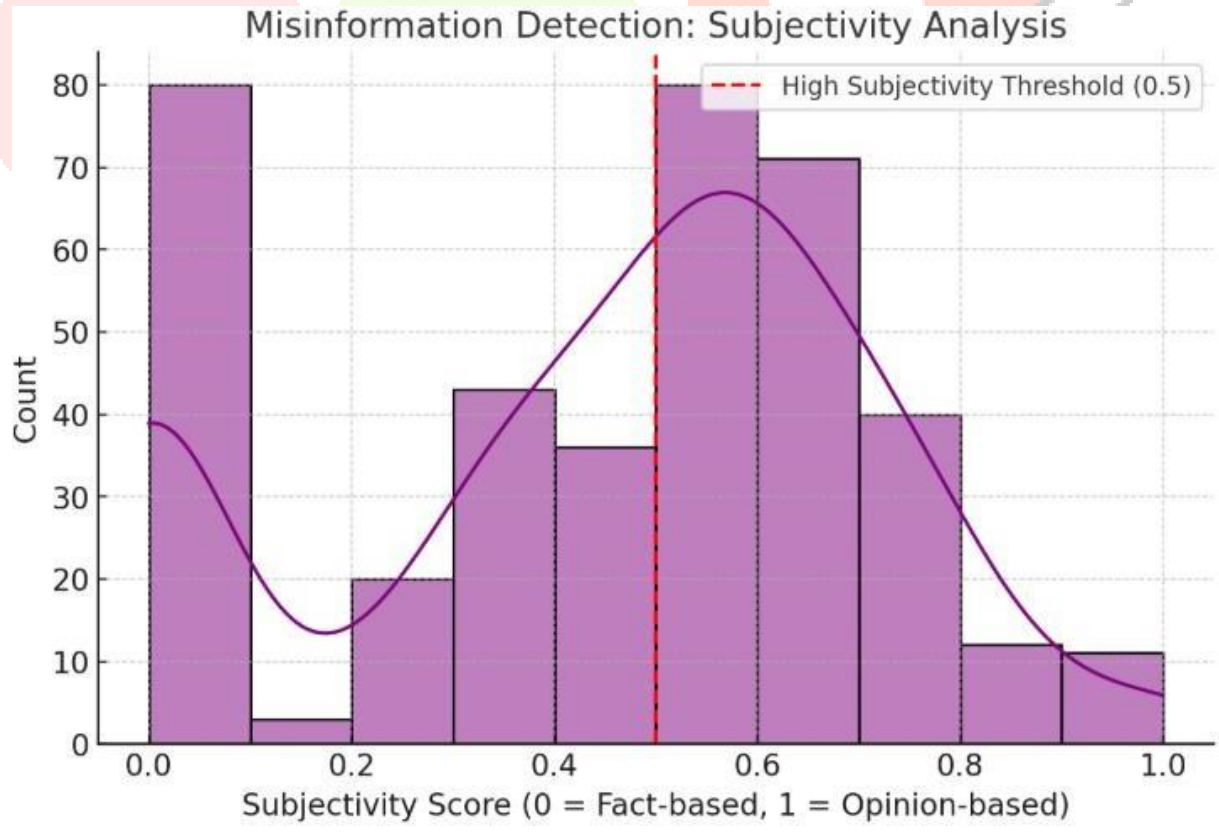

Figure 3. Misinformation Detection - Subjectivity Analysis Chart

4.4 Common misleading words

Survey results identified commonly used misleading words:

- Words like ‘always’, ‘never’, ‘100% true’, ‘proven wrong’ frequently appeared.
- Words like these often include exaggerated claims.

The keyword analysis was performed using NLTK to break the response into words. This is a list of keywords to filter misleading common terms. The WordCloud is used to create a graphic display of word frequencies shown in Figure 4.

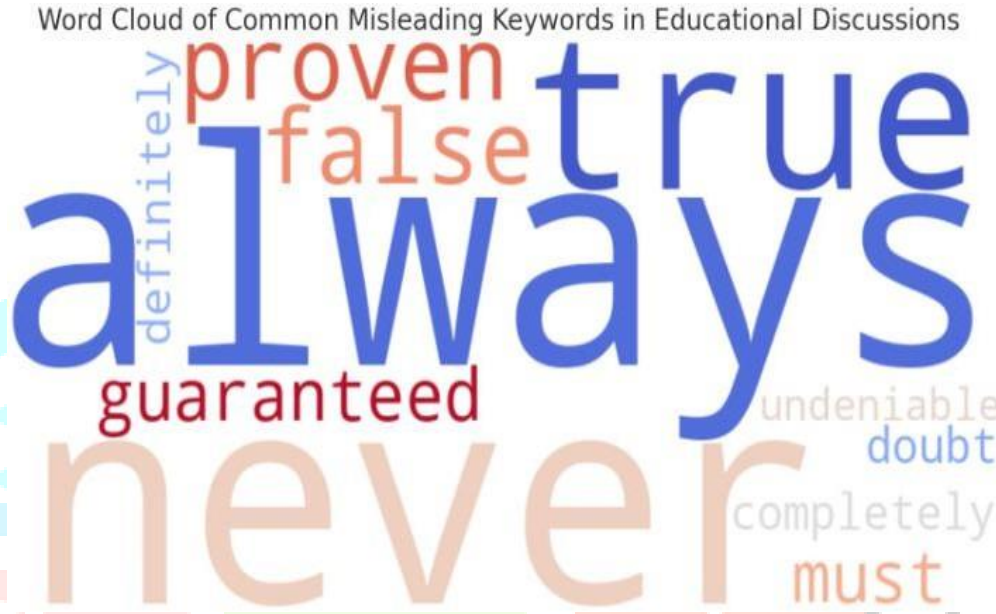

Figure 4. Word Cloud of Common Misleading Keywords

4.5 Sentiment Analysis Findings

Survey results showed the following trends:

1. 39.75% of participants feel social media has positive influence in education.
2. Almost 20% claimed it distracts them.
3. 42.25% were neutral about the impact.

The positive, negative and neutral sentiment analysis was performed using an AI-based classifier. As seen in Figure 5 below, the majority of the responses are Positive(green) or Neutral(blue), while a few are Negative(red).

Sentiment Analysis Results: {'Positive': 159, 'Negative': 72, 'Neutral': 169}

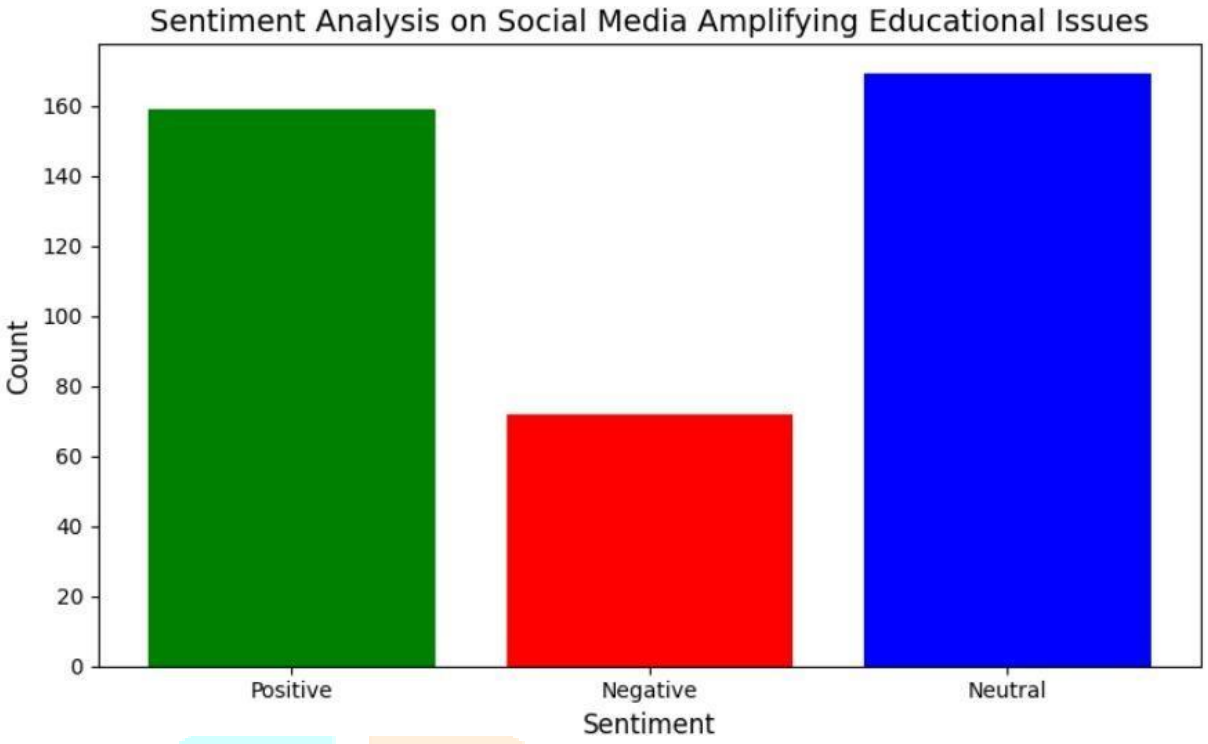

Figure 5. Sentiment Analysis

4.6 Clustering

Clustering was carried out to identify learning trends in online discussions. The k means clustering and the PCA graph in Figure 6 show that the education talks have two main discussions:

1. **Traditional Learning (Cluster 1)** - This cluster consists of discussions centered on classroom-based education, face-to-face interactions, and structured academic programs. People in this group often talk about discipline, participation, and the effectiveness of in-person teaching.

2. **Online Learning (Cluster 2)** - This cluster includes discussions on digital education platforms, e-learning courses, and self-paced study programs. Resources that fall into this category highlight flexibility, accessibility, and cost-saving ability, but come with engagement and misinformation issues.

PCA technique is used for dimensionality reduction and helps in seeing the position of these two classes of data points. The data spread in the respective cluster indicates that a clear view exists regarding traditional and online learning discussions.

However, some mixed opinions indicates otherwise. Certain users prefer a blended model that combines face-to-face class experiences with supplementary online features. With the help of clustering analysis, user preferences could be understood.

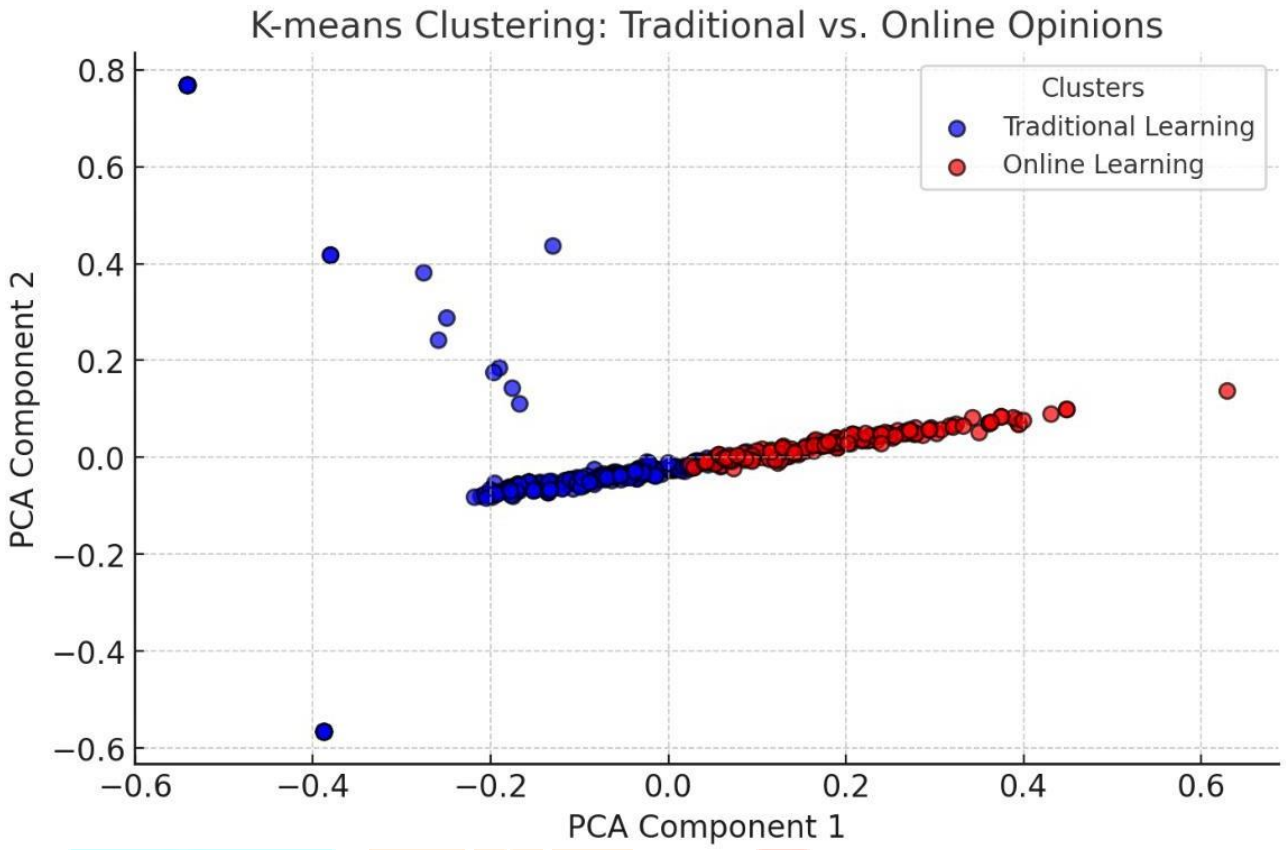

Figure 6. K-Means Clustering with PCA - Traditional vs. Online Learning

5. Conclusion and Future Work

Social media is a great knowledge- sharing tool but misinformation is also available. In education, technology such as sentiment analysis and clustering offers great insight into public engagement and views on education. To make the best use of social media for education, the following are suggested:

1. AI-based fact-checking systems should be integrated in social media platforms to verify information credibility.

2. Educators should actively engage in social media discussions to provide reliable knowledge.

3. Interactive learning tools should be developed to make educational content more engaging.

Future studies should explore:

- Using more advanced AI models like BERT for sentiment detection.
- Social media influencer and the teacher's role in content creation.
- AI tools to obtain solution against misinformation in real-time situation.

- Including additional linguistic and contextual features for better classification.
- Use visualization tools to help understand the spread of misinformation in online education.

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