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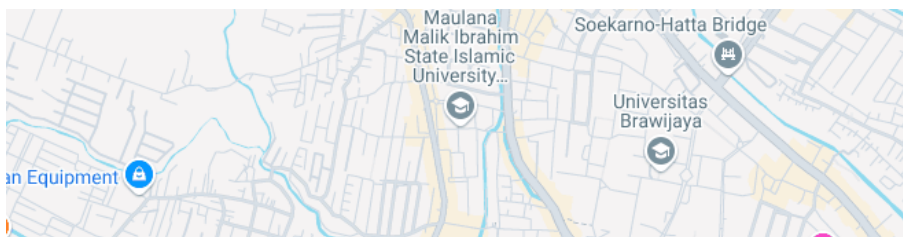
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NATURAL LANGUAGE PROCESSING-BASED BLENDED LEARNING IN THE EFL FLIPPED CLASSROOM: A CONCEPTUAL FRAMEWORK AND PROPOSED DESIGNS

FX. Risang Baskara

English Letters Department, Faculty of Letters, Universitas Sanata Dharma, Yogyakarta, Indonesia
Faculty of Business, Design, and Arts, Swinburne University of Technology, Sarawak Campus, Malaysia

Abstract

The use of Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom has the potential to support blended learning and enhance learner autonomy and language development. However, there is a need for more research on the use of NLP in the EFL flipped classroom. This paper addresses this research gap by proposing a conceptual framework for using NLP in the EFL flipped classroom and a set of proposed designs and activities incorporating NLP to enhance learner autonomy and language development. This paper aims to provide a conceptual framework for using NLP in the EFL flipped classroom and propose a set of designs and activities incorporating NLP to enhance learner autonomy and language development. This paper's methodology involves reviewing the literature on NLP and the flipped classroom and developing a conceptual framework and proposed designs and activities. The product of this paper is a conceptual framework for using NLP in the EFL flipped classroom to support blended learning and a set of proposed designs and activities that incorporate NLP to enhance learner autonomy and language development. This paper concludes that NLP has the potential to support blended learning and enhance learner autonomy and language development in the EFL flipped classroom. However, further research is needed to evaluate the effectiveness of these approaches and identify best practices for using NLP in the EFL flipped classroom

Keywords: Blended learning, EFL, Flipped classroom, Learner autonomy, Learner development, NLP

* Correspondence Address: risangbaskara@usd.ac.id

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INTRODUCTION

مقدمة

In recent years, there has been increasing interest in using technology to enhance language learning, particularly in the flipped classroom context (Ahmed & Indurkha, 2020; Latorre-Coscolluela et al., 2021; Shi, MacLeod, & Yang, 2020). The use of technology to enhance language learning has gained increasing attention in recent years, with the flipped classroom being one such approach that has received particular interest. The flipped classroom is an instructional model in which students watch or review pre-recorded lectures or other materials outside of class and use class time for more interactive activities such as discussion and problem-solving (Basal, 2015; Chuang, Weng, & Chen, 2018; O'Flaherty, & Phillips, 2015). This approach can potentially increase learner engagement and facilitate more personalized and interactive learning experiences.

The use of technology in the flipped classroom can take many forms, including online videos, podcasts, and other multimedia materials, as well as interactive learning activities and assessments (Artal-Sevil, 2019; Onodipe & Ayadi, 2020; Rajaram, 2019). Language learning software and apps, virtual tutors, and other NLP-based tools can also support language development in the flipped classroom. By leveraging technology to support language learning, educators can create flexible and adaptable learning environments that cater to the needs and preferences of diverse learners (Alamri, Watson, & Watson, 2021).

There is a growing body of research on the effectiveness of the flipped classroom for language learning, and the results are generally positive (Öztürk & Çakıroğlu, 2021; Shi, MacLeod, & Yang, 2020; Wang & Qi, 2018). Studies have found that the flipped classroom can lead to improved learner engagement, motivation, and achievement in language learning contexts (Abdullah, Hussin, & Ismail, 2019; Afzali & Izadpanah, 2021; Haghighi, Jafarigohar, Khoshshima, & Vahdany, 2019). However, more research is needed to understand how the flipped classroom enhances language learning and identify best practices for implementing this approach in different educational contexts.

Natural Language Processing (NLP) is a subfield of artificial intelligence (AI) that focuses on the interaction between computers and human language (Mishra & Kumar, 2020). It involves the development of algorithms and systems that can understand, interpret, and generate human language (Meera & Geerthik, 2022). NLP has many applications, including language translation, text summarization, and sentiment analysis (Joty, Carenini, Ng, & Murray, 2019).

In the context of language learning, NLP has the potential to support language development in a variety of ways. For example, NLP-based language learning games can provide learners with interactive and personalized practice (Pokrivčáková, 2019). In contrast, NLP-based chatbots or virtual tutors can engage learners in conversation practice and provide feedback on their language use (Ruan et al., 2019). NLP can also be used to personalize learning materials and scaffold learners' language development, as well as to track learners' progress and provide a formative assessment (Rodrigues & Oliveira, 2014).

However, more research is needed to understand the most effective ways to incorporate NLP in language learning contexts and to identify potential challenges and limitations. In this paper, we propose a conceptual framework for using NLP in the EFL (English as a Foreign Language) flipped classroom to support blended learning, which combines online and face-to-face learning. Blended learning is an instructional model that combines online and face-to-face learning and has the potential to offer learners a more flexible and personalized learning experience (Watson, 2008). This paper proposes a conceptual framework for using NLP in the flipped EFL (English as a Foreign Language) classroom to support blended learning.

The proposed framework consists of three main elements: (1) online learning materials and activities that incorporate NLP; (2) face-to-face class sessions that use NLP-based scaffolding and formative assessment; and (3) learner autonomy and self-regulation. These elements are interconnected and can support language development in the EFL flipped classroom (Hwang, Nurtantyana, & Hariyanti, 2023).

Online learning materials and activities incorporating NLP could include language learning games, chatbots, virtual tutors, and other interactive learning tools. These materials can provide learners with personalized and engaging practice opportunities and can be accessed anytime and anywhere (Zainuddin & Perera, 2018). Face-to-face class sessions can use NLP-based scaffolding and formative assessment to support language development. For example, NLP-based tools can

provide learners with feedback on their language use, track learners' progress, and identify areas for improvement (Çakiroğlu & Öztürk, 2020). Learner autonomy and self-regulation are also essential components of the proposed framework. NLP can support learners in taking charge of their learning, setting goals, and tracking their progress. This can help promote learner engagement and motivation and lead to more effective language learning (Namaziandost & Çakmak, 2020).

We also describe a set of proposed designs and activities incorporating NLP in the EFL flipped classroom to enhance learner autonomy and language development. This paper describes a set of proposed designs and activities incorporating NLP in the EFL (English as a Foreign Language) flipped classroom to enhance learner autonomy and language development. These designs and activities are intended to be used within the conceptual framework outlined in the paper, which combines online and face-to-face learning to support blended learning in the EFL flipped classroom (Dooly & Sadler, 2019).

Possible NLP-based designs and activities in the EFL flipped classroom include language learning games, chatbots, personalized materials, and formative assessment tools. These games offer personalized practice by analyzing responses for accuracy and providing feedback. Chatbots engage learners in conversation practice, responding to inputs and offering guidance. NLP personalizes materials to learners' needs, adapting activities. Formative tools track progress, analyzing responses for language use feedback.. (Wu, Yang, Hsieh, & Yamamoto, 2020)

METHOD

منهج

The flipped classroom reverses the traditional model of classroom instruction, in which lectures are delivered in class, and students are expected to complete readings or other assignments outside of class (Brewer & Movahedazarhouli, 2018; Green, 2015; Kurt, 2017). The flipped classroom has several potential benefits for language learning. For example, it can allow learners to review materials at their own pace and to pause, rewind, or replay lectures or other materials as needed (Chen & Hwang, 2020; Ishak et al., 2020; McCarthy, 2016). This can facilitate more personalized and self-directed learning. In addition, the flipped classroom can allow for more interactive and collaborative learning, as students can discuss, debate, and problem-solve with their peers and the instructor (Nerantzi, 2020; Velegol, Zappe, & Mahoney, 2015; Wallace et al., 2014).

Research has generally found that the flipped classroom can effectively improve learner engagement and outcomes in various educational contexts (Bond, 2020; Lai, 2021; Lo & Hew, 2021). This includes the context of English as a Foreign Language (EFL), where the flipped classroom can enhance language learning in several ways (Afzali & Izadpanah, 2021; Alsowat, 2016; Li & Li, 2022).

The ability for students to review information at their own speed and to pause, rewind, or repeat lectures or other resources as necessary is one of the primary advantages of using the flipped classroom approach to teaching English as a foreign language (EFL) (Senali et al., 2022). This can facilitate more personalized and self-directed learning, which is particularly useful for learners with different language backgrounds or learning styles (Lee, Davis, & Li, 2022).

In a flipped classroom, students can converse, argue, and find solutions to problems with their classmates and the teacher, which can also make for a more active and cooperative learning

environment (Ismail & Abdulla, 2019). This can promote learner engagement and motivation and support learners in developing their language skills in a more authentic and realistic context.

NLP has been utilized in education for language learning through games, chatbots, and automated speech recognition. However, further research is necessary on its application in the flipped classroom, especially in EFL contexts. Despite the increasing interest in NLP in education, more studies are needed to explore its challenges and limitations in the flipped classroom, such as accessibility and affordability of tools, as well as learners' potential overreliance on technology, which may overshadow traditional language-learning methods.

RESULT | نتائج

This paper outlines a conceptual framework for using Natural Language Processing (NLP) in the flipped classroom of the English as a Foreign Language (EFL) classroom to support blended learning. Blended learning is an instructional model that combines online and face-to-face learning and has the potential to offer learners a more flexible and personalized learning experience (Xi, 2021).

The proposed framework consists of three main elements: (1) online learning materials and activities that incorporate NLP; (2) face-to-face class sessions that use NLP-based scaffolding and formative assessment; and (3) learner autonomy and self-regulation. These elements are interconnected and can support language development in the EFL flipped classroom (Ma'rufa & Mustofa, 2021).

Online learning materials and activities incorporating Natural Language Processing (NLP) can provide learners with personalized and engaging practice opportunities and can be accessed anytime and anywhere (Pokrivčáková, 2019). These materials and activities can effectively support language learning in the flipped classroom, particularly in the context of English as a Foreign Language (EFL).

During face-to-face class sessions, Natural Language Processing (NLP)-based scaffolding and formative assessment can support language development in the flipped classroom of English as a Foreign Language (EFL). These strategies can provide learners with feedback and guidance on their language use, help track their progress, and identify areas for improvement (Wambsgans et al., 2020).

Some examples of how NLP-based scaffolding and formative assessment can be used in the EFL flipped classroom include providing learners with feedback on their language use, tracking their progress, and providing support and guidance. NLP-based tools can analyze learners' written or spoken responses and provide feedback on grammar, vocabulary, or pronunciation. This can help learners identify and address their weaknesses, providing opportunities for learners to receive immediate feedback on their language use (Khalil & Fahim, 2017).

NLP-based tools can be used to track learners' progress over time and identify areas for improvement. For example, a tool could analyze learners' responses to formative assessments and provide feedback on learners' language development. NLP-based tools can provide learners with support and guidance on language-related tasks and activities. For example, a tool could provide learners with customized feedback and guidance on their language use or offer personalized practice activities based on learners' needs and abilities (Hwang, Nurtantyana, & Hariyanti, 2023).

Learner autonomy and self-regulation are essential components of the proposed framework for using Natural Language Processing (NLP) in the flipped classroom in the English as a Foreign Language (EFL) classroom to support blended learning. NLP can support learners in taking charge of their learning, setting goals, and tracking their progress. This can help promote learner engagement and motivation and lead to more effective language learning (Day & Tosey, 2011).

Some examples of how NLP can support learner autonomy and self-regulation in the EFL flipped classroom include personalized learning materials, Formative assessment tools, and Learner analytics. NLP can be used to personalize learning materials to the needs and abilities of individual learners. For example, a learning platform could use NLP to analyze learners' responses and adapt the materials and activities to support their language development better. This can help learners to set appropriate learning goals and to track their progress (Huang, 2020).

NLP-based formative assessment tools can track learners' progress and provide feedback on language use. For example, a tool could use NLP to analyze learners' written or spoken responses and provide feedback on grammar, vocabulary, or pronunciation. This can help learners to monitor their progress and identify areas for improvement (Hu & Zhang, 2022). NLP-based learner analytics can provide insights into their learning patterns and progress. For example, a learning platform could use NLP to track learners' activity and performance and provide learners with feedback on their learning habits and strengths and weaknesses. This can help learners to set appropriate learning goals and to track their progress (Nakata, 2014).

In this paper, we describe how the three elements of the proposed framework for using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom to support blended learning are interconnected and how they can support language development (Shahnama, Ghonsooly, & Elwood, 2021). The first element of the proposed framework for using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom to support blended learning is online learning materials and activities incorporating NLP. These materials and activities can provide learners with personalized and engaging practice opportunities and can be accessed anytime and anywhere (Zainuddin & Perera, 2018).

Some examples of online learning materials and activities incorporating NLP include language learning games, chatbots or virtual tutors, personalized learning materials, and formative assessment tools. NLP-based language learning games can provide learners with interactive and personalized practice (Hsieh, Wu, & Marek, 2017). For example, a game could use NLP to analyze the grammatical accuracy of a learner's written or spoken responses and provide feedback on errors or areas for improvement. NLP-based chatbots or virtual tutors can engage learners in conversation practice and language learning activities (Wu, Hsieh, & Yang, 2017). For example, a chatbot or virtual tutor could use NLP to recognize and respond to learner inputs, providing feedback and guidance as needed.

NLP can be used to personalize learning materials to the needs and abilities of individual learners (Alroudhan, 2018). For example, a learning platform could use NLP to analyze learners' responses and adapt the materials and activities to support their language development better. NLP-based formative assessment tools can track learners' progress and provide feedback on language use (Çakıroğlu & Öztürk, 2020). For example, a tool could use NLP to analyze learners' written or spoken responses and provide feedback on grammar, vocabulary, or pronunciation.

The second element of the proposed framework for using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom to support blended learning is face-to-face class sessions that use NLP-based scaffolding and formative assessment (Comerford et al., 2018). During class sessions, instructors can use NLP-based tools to provide learners with feedback on their language use, track learners' progress, and identify areas for improvement (Haghighi et al., 2018). This can support language development by helping learners identify and address their weaknesses and providing opportunities for learners to receive immediate feedback on their language use (Khalil & Fahim, 2017).

Some examples of how NLP-based scaffolding and formative assessment can be used during face-to-face class sessions include Providing learners with feedback on their language use, tracking learners' progress, and providing support and guidance (Çakıroğlu & Öztürk, 2020). NLP-based tools can analyze learners' written or spoken responses and provide feedback on grammar, vocabulary, or pronunciation. This can help learners identify and address their weaknesses and provide opportunities to receive immediate feedback on their language use (Hwang, Nurtantyan, & Hariyanti, 2023). NLP-based tools can be used to track learners' progress over time and identify areas for improvement. For example, a tool could analyze learners' responses to formative assessments and provide feedback on learners' language development (deBoer, 2018). NLP-based tools can provide learners with support and guidance on language-related tasks and activities. For example, a tool could provide learners with customized feedback and guidance on their language use or offer personalized practice activities based on learners' needs and abilities (Bunger, 2021).

The third element of the proposed framework for using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom to support blended learning is learner autonomy and self-regulation (Pasaribu & Wulandari, 2021). NLP can support learners in taking charge of their learning, setting goals, and tracking their progress. This can help promote learner engagement and motivation and lead to more effective language learning (Zou & Xie, 2018).

Some examples of how NLP can support learner autonomy and self-regulation in the EFL flipped classroom include personalized learning materials, formative assessment tools, and learner analytics (Henderson, 2017). NLP can be used to personalize learning materials to the needs and abilities of individual learners. For example, a learning platform could use NLP to analyze learners' responses and adapt the materials and activities to support their language development better (Noroozi, Rezvani, & Ameri-Golestan, 2020). This can help learners to set appropriate learning goals and to track their progress.

NLP-based formative assessment tools can track learners' progress and provide feedback on language use. For example, a tool could use NLP to analyze learners' written or spoken responses and provide feedback on grammar, vocabulary, or pronunciation (Roohani & Etemadfar, 2021). This can help learners to monitor their progress and identify areas for improvement. NLP-based learner analytics can provide insights into their learning patterns and progress. For example, a learning platform could use NLP to track learners' activity and performance and provide learners with feedback on their learning habits, strengths and weaknesses (Nasr, Bagheri, Sadighi, & Rassaei, 2018). This can help learners to set appropriate learning goals and to track their progress.

These elements are interconnected and can support language development in the EFL flipped classroom by providing learners with personalized and interactive learning experiences that cater to their needs and abilities and promote learner engagement and motivation (Haghighi

et al., 2018). Thus, NLP can be a powerful tool for supporting learner autonomy and self-regulation in the EFL flipped classroom. By providing learners with personalized and interactive learning experiences, tracking their progress, and providing feedback, NLP can help them take charge of their learning and set and achieve learning goals. This can promote learner engagement and motivation and lead to more effective language learning (Poole, 2021).

DISCUSSION

مناقشة

This paper describes a set of proposed classroom designs and activities incorporating Natural Language Processing (NLP) in the flipped classroom of English as a Foreign Language (EFL) (Fathi & Rahimi, 2020). These designs and activities are intended to be used within the conceptual framework outlined in the paper, which combines online and face-to-face learning to support blended learning in the EFL flipped classroom (Lo & Hew, 2017).

Language learning games incorporating Natural Language Processing (NLP) can provide learners with interactive and personalized practice opportunities. These games can be beneficial for reinforcing language skills in a fun and engaging way (Lin & Hwang, 2018).

Here are some examples of how NLP-based language learning games can be used in the English as a Foreign Language (EFL) flipped classroom:

1. Grammar practice games: NLP can be used to create games that focus on specific grammar points or structures. For example, a game could use NLP to analyze the grammatical accuracy of a learner's written or spoken responses and provide feedback on errors or areas for improvement. This can help learners practice and reinforce their understanding of grammar rules.
2. Vocabulary games: NLP can create games that focus on vocabulary development. For example, a game could use NLP to present learners with a series of words or phrases and ask learners to choose the correct definition or use the word in a sentence. This can help learners to expand their vocabulary and improve their language skills.
3. Pronunciation games: NLP can be used to create games that focus on pronunciation skills. For example, a game could use NLP to present learners with a series of words or phrases and ask them to record their pronunciation. The game could then use NLP to compare the learner's pronunciation to a native speaker's and provide feedback on areas for improvement.

NLP-based chatbots and virtual tutors can effectively engage learners in conversation practice and language learning activities. These tools can provide learners with personalized and interactive learning experiences and can support language development flexibly and conveniently (Tohei, 2018).

Here are some examples of how NLP-based chatbots and virtual tutors can be used in the English as a Foreign Language (EFL) flipped classroom:

1. Conversation practice: Chatbots and virtual tutors can use NLP to recognize and respond to learner inputs, providing learners with opportunities to practice their speaking and listening skills. For example, a chatbot or virtual tutor could present learners with questions or prompts and ask learners to respond orally or in writing. The chatbot or virtual tutor could then use NLP to analyze the learner's responses and provide feedback on grammar, vocabulary, or pronunciation.

2. Vocabulary development: Chatbots and virtual tutors can use NLP to present learners with new words or phrases and ask learners to use them in conversation or writing. For example, a chatbot or virtual tutor could present learners with a series of words or phrases and ask them to use them in conversations with the chatbot or virtual tutor. The chatbot or virtual tutor could then use NLP to analyze the learner's use of the new words or phrases and provide feedback.
3. Grammar practice: Chatbots and virtual tutors can use NLP to provide learners with practice on specific grammar points or structures. For example, a chatbot or virtual tutor could present learners with a series of sentences that contain errors and ask learners to correct the errors. The chatbot or virtual tutor could then use NLP to analyze the learner's responses and provide feedback on grammar accuracy.

NLP-based personalized learning materials can effectively support language development in the flipped classroom of English as a Foreign Language (EFL). By adapting materials and activities to the needs and abilities of individual learners, these materials can provide learners with personalized and engaging learning experiences and support language development flexibly and conveniently (Zou & Xie, 2018).

Here are some examples of how NLP-based personalized learning materials can be used in the EFL flipped classroom:

1. Adaptive learning platforms: Learning platforms that use NLP can analyze learners' responses and adapt the materials and activities to support their language development better. For example, a learning platform could use NLP to track learners' progress and identify areas for improvement. It could then provide learners with customized practice activities or additional support in those areas.
2. Customized practice activities: NLP can create customized practice activities tailored to individual learners' needs and abilities. For example, a learning platform could use NLP to analyze learners' responses and create practice activities tailored to learners' strengths and weaknesses.
3. Personalized feedback: NLP can be used to provide learners with personalized feedback on their language use. For example, a learning platform could use NLP to analyze learners' responses and provide feedback on grammar, vocabulary, or pronunciation. This can help learners to identify and address their weaknesses and to track their progress.

NLP-based formative assessment tools can be effective for tracking learners' progress and providing feedback on their language use in the English as a Foreign Language (EFL) flipped classroom. These tools can help learners to monitor their progress and identify areas for improvement. They can support language development by providing learners with personalised and immediate feedback on their language use (Çakıroğlu & Öztürk, 2020).

Here are some examples of how NLP-based formative assessment tools can be used in the EFL flipped classroom:

1. Grammar feedback: Formative assessment tools that use NLP can provide learners with feedback on their grammar accuracy. For example, a tool could analyze learners' written or spoken responses and highlight errors or areas for improvement. This can help learners to identify and address their weaknesses and to track their progress.

2. Vocabulary feedback: Formative assessment tools that use NLP can provide learners with feedback on their vocabulary use. For example, a tool could analyze learners' written or spoken responses and highlight errors or areas for improvement. This can help learners to expand their vocabulary and improve their language skills.
3. Pronunciation feedback: Formative assessment tools that use NLP can provide learners with feedback on their pronunciation skills. For example, a tool could analyze learners' spoken responses and highlight areas for improvement. This can help learners to improve their pronunciation and to track their progress.

This paper also discusses the potential benefits and challenges of using Natural Language Processing (NLP) in the flipped classroom and suggests ways to overcome these challenges (Hashim & Shaari, 2020). One potential benefit of using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom is enhanced learner engagement and motivation. NLP-based learning activities and tools can provide learners with interactive and personalized learning experiences, promoting learner engagement and motivation (Huang, 2022).

Here are some examples of how NLP can enhance learner engagement and motivation in the EFL flipped classroom:

1. Personalized learning materials: NLP-based personalized learning materials can be tailored to the needs and abilities of individual learners. This can provide learners with engaging and relevant learning experiences and promote learner engagement and motivation.
2. Interactive learning activities: NLP-based learning activities such as language learning games or chatbots can be interactive and engaging. This can provide learners with opportunities to practice their language skills in a fun and interactive way and can promote learner engagement and motivation.
3. Feedback and progress tracking: NLP-based formative assessment tools can provide learners with feedback on their language use and track their progress. This can help learners monitor their progress and identify areas for improvement, promoting learner engagement and motivation.

Another potential benefit of using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom is improved language development. NLP can provide learners with feedback and guidance on their language use, which can support language development and improve learner outcomes (Zou & Zhang, 2021).

Here are some examples of how NLP can support language development and improve learner outcomes in the EFL flipped classroom:

1. Feedback on language use: NLP-based formative assessment tools can provide learners with feedback on their language use, including grammar, vocabulary, and pronunciation. This can help learners to identify and address their weaknesses and to track their progress, which can support language development.
2. Personalized learning materials: NLP-based personalized learning materials can be tailored to the needs and abilities of individual learners. This can provide learners with relevant and challenging learning experiences, supporting language development and improving learner outcomes.
3. Conversation practice: NLP-based chatbots and virtual tutors can provide learners with opportunities to practice their speaking and listening skills through conversation. This can

support language development and improve learner outcomes by providing personalized and interactive learning experiences.

Increased learner autonomy and self-regulation are other potential benefits of using Natural Language Processing (NLP) in the flipped classroom of English as a Foreign Language (EFL). NLP can support learners in taking charge of their learning, setting goals, and tracking their progress, leading to increased learner autonomy and self-regulation (Su Ping et al., 2020).

Here are some examples of how NLP can support learner autonomy and self-regulation in the EFL flipped classroom:

1. Personalized learning materials: NLP-based personalized learning materials can be tailored to the needs and abilities of individual learners. This can provide learners with relevant and challenging learning experiences and support learner autonomy and self-regulation by allowing them to take charge of their learning.
2. Feedback and progress tracking: NLP-based formative assessment tools can provide learners with feedback on their language use and track their progress. This can help learners monitor their progress and identify areas for improvement, supporting learner autonomy and self-regulation.
3. Goal setting: NLP-based learning platforms can support learners in setting goals and tracking their progress. For example, a learning platform could use NLP to track learners' progress and provide feedback, helping them set and achieve learning goals.

However, there are also potential challenges to using NLP in the flipped classroom. One potential challenge of using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom is accessibility and affordability. Some NLP-based tools may be cost-prohibitive or require specialized hardware or software, which can be a barrier to their use (Wagner & Urhahne, 2021).

Here are some ways in which the accessibility and affordability of NLP-based tools can be addressed in the EFL flipped classroom:

1. Open-source tools: Many open-source NLP tools are available, which can be used for free. These tools can be a good option for educators who want to use NLP but do not have the budget for more expensive options.
2. Free trial periods: Some NLP-based tools may offer free trial periods, allowing educators to try the tools before deciding whether to purchase them. This can be an excellent way to evaluate the tools' effectiveness and determine whether they are worth the investment.
3. Hardware and software requirements: Some NLP-based tools may have specific hardware or software requirements, which can be a barrier to their use. Educators should carefully consider these requirements and ensure they have the necessary resources to use the tools effectively.

Another potential challenge of using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom is the risk of overreliance on technology. There is a risk that learners may become overly reliant on technology and neglect other essential language learning strategies, such as interacting with native speakers or engaging in authentic language use (Teng, 2018).

Here are some ways in which the risk of overreliance on technology can be addressed in the EFL flipped classroom:

1. **Balancing online and face-to-face learning:** One way to address the risk of overreliance on technology is to balance online and face-to-face learning. This can involve using NLP-based tools and activities in conjunction with traditional language learning strategies, such as speaking and listening practice with native speakers or immersion in authentic language use.
2. **Encouraging learner autonomy:** Another way to address the risk of overreliance on technology is to encourage learner autonomy and self-regulation. This can involve helping learners to set their own learning goals and to monitor their progress rather than relying solely on technology to guide their learning.
3. **Providing a variety of learning experiences:** To avoid overreliance on technology, it can be helpful to provide learners with various learning experiences, including both online and face-to-face activities. This can help learners develop a range of language learning strategies rather than rely solely on technology.

Another potential challenge of using Natural Language Processing (NLP) in the English as a Foreign Language (EFL) flipped classroom is limited language coverage. Some NLP tools may only be available for specific languages or cannot accurately recognize or analyze all aspects of language (Pasaribu & Wulandari, 2021).

Here are some ways in which the challenge of limited language coverage can be addressed in the EFL flipped classroom:

1. **Selecting appropriate tools:** To ensure that NLP tools can recognize and analyze language accurately, carefully selecting suitable tools for the language being learned is essential. Educators should carefully research the capabilities of different NLP tools and choose those that can recognize and analyze the target language accurately.
2. **Supplementing with other resources:** To ensure that learners have access to a wide range of language learning resources, it may be helpful to supplement NLP-based tools with other resources, such as traditional language learning materials or interactions with native speakers.
3. **Limiting reliance on technology:** To avoid relying too heavily on technology, it can be helpful to limit the use of NLP-based tools and to incorporate other language learning strategies, such as speaking and listening practice with native speakers or immersion in authentic language use.

Considering the appropriate use of NLP in the flipped classroom is essential to overcome these challenges and identify and addressing potential barriers. This may involve providing learners access to various learning materials and activities, including both NLP-based and non-NLP-based options, and encouraging learners to engage in authentic language use outside the classroom. It may also involve providing instructors with training and support to incorporate NLP into their teaching practice effectively (Turan & Akdag-Cimen, 2020).

CONCLUSSION | خاتمة

This paper proposes a conceptual framework for integrating Natural Language Processing (NLP) into the English as a Foreign Language (EFL) flipped classroom to support blended learning. The framework comprises online learning materials and activities, NLP-based scaffolding and

formative assessment during face-to-face sessions, and promoting learner autonomy and self-regulation. These interconnected elements aim to provide personalized and interactive learning experiences, fostering learner engagement and motivation while supporting language development.

Additionally, a set of proposed designs and activities incorporating NLP in the EFL flipped classroom are outlined to enhance learner autonomy and language development. These include language learning games, chatbots, virtual tutors, personalized materials, and formative assessment tools, offering interactive and personalized learning experiences. However, further research is needed to assess the effectiveness of these approaches and determine best practices for NLP integration in the EFL flipped classroom. Experimental studies and qualitative data collection from learners and instructors could shed light on the impact, usability, and challenges of NLP-based tools and activities in this context.

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