



CHALLENGES IN PRONOUNCING INDONESIAN VOWELS: PHONEME REALIZATION AMONG AMERICAN BIPA LEARNERS

*Tantangan dalam Melafalkan Vokal Bahasa Indonesia:
Realisasi Fonem di Kalangan Pemelajar BIPA Amerika*

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Abstrak

Karena pertukaran bahasa budaya, dan nilai strategis untuk dapat berkomunikasi dalam bahasa Indonesia untuk tujuan akademis, bisnis, dan diplomatik, jumlah siswa asing yang mendaftar di program Bahasa Indonesia untuk Penutur Asing (BIPA) telah meningkat. Ketika pemelajar BIPA memperoleh bahasa Indonesia sebagai bahasa kedua, hal ini menjadi tantangan tersendiri. Tujuan dari penelitian ini adalah mengidentifikasi realisasi vokal bahasa Indonesia dalam BIPA (Bahasa Indonesia bagi Penutur Asing) oleh mahasiswa asal Amerika yang belajar bahasa Indonesia, serta melihat realisasi vokal yang paling umum diproduksi oleh pemelejar BIPA. Metode yang digunakan adalah penelitian kualitatif yang dilakukan dengan metode deskriptif. Data dikumpulkan dari wawancara mendalam dan rekaman sampel ujaran. Analisis dilakukan dengan mentranskrip ucapan ke dalam transkripsi fonetik untuk menemukan realisasi fonem yang diucapkan oleh mahasiswa BIPA dari Amerika. Data terdiri dari berbagai fonem fonologis yang diucapkan oleh tujuh mahasiswa BIPA Amerika di Universitas Negeri Malang. Hasil penelitian menunjukkan bahwa ada tiga kategori realisasi fonem linguistik yaitu penambahan fonem, penghilangan fonem, dan perubahan fonem. Data menunjukkan realisasi fonem yang berbeda terjadi pada vokal /a/, /i/, /e/, /o/, /ə/, /u/, /u/. Dengan memahami realisasi yang berbeda ini, para pengajar dapat mengembangkan rencana pelajaran yang lebih efektif untuk meningkatkan pelafalan dan kefasihan bagi para pemelajar BIPA.

Kata-kata kunci: *pemelajar Amerika, BIPA, Pelafalan bahasa Indonesia, realisasi fonologis.*

Abstract

Due to cultural linguistic exchanges, and the strategic value of being able to communicate in the language for academic, business, and diplomatic purposes, the number of foreign students enrolling in Bahasa Indonesia for Foreign Speakers (BIPA) programs has increased. As BIPA students acquire Indonesian as a second language, it will be challenging. The purpose of this study is to identify the realization of Indonesian vowels in BIPA (Indonesian for Foreign Speakers) by American students learning Indonesian, as well as to see the most common vowel realizations produced by BIPA learners. The method used was Qualitative research conducted with a descriptive method. Data were collected from in-depth interviews and recorded speech samples. The analysis was conducted by transcribing speech into phonetic transcriptions to find the realization of phonemes uttered by BIPA students from America. Data consist of different phonological phonemes that were uttered by seven American BIPA students at Malang University. The result show that there were three categories of phoneme realization linguistic, there are phoneme additions, phoneme deletions, and phoneme alterations. The data showed different realization phonemes occurred in Vowel /a/, /i/, /e/, /o/, /ə/, /u/, /u/. By understanding these

different realizations, educators can develop more effective lesson plans to improve pronunciation and fluency for American BIPA learners.

Keywords: American students, BIPA, Indonesian pronunciation, Phonological realization.

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INTRODUCTION

The number of international students enrolling in Bahasa Indonesia for Foreign Speakers (BIPA) programs has increased steadily over the past ten years due to the growing need for globalization, cross-cultural communication and the growing strategic value of the Indonesian language for academic, business, and diplomatic purposes. The increasing pace of globalization is accompanied by a growing interest among non-native speakers in learning Indonesian (Idris et al., 2024; Syahri et al., 2024). It was the outcome of a complex interaction of political, cultural, historical, and economic variables. In recent years, the number of foreign learners studying Bahasa Indonesia, particularly through BIPA (Bahasa Indonesia bagi Penutur Asing) programs, has significantly increased. Among them, American learners represent a growing demographic. Despite their enthusiasm, many face persistent challenges in mastering the pronunciation of Indonesian vowel sounds. The central problem is in the realization of Indonesian vowel phonemes, which often deviates from native pronunciation norms due to interference from their first language that is American English. This phonological interference leads to articulatory difficulties that affect both intelligibility and fluency in spoken Indonesian.

An assessment of a language's potential for global recognition requires an understanding of how these factors contribute to the globalization of some languages while keeping others regionally confined. Language can serve as a tool for knowledge transfer to support globalization according to (Huszka et al., 2024). American BIPA learners are typically defined as a person who picks up the target language (L2) throughout adolescence or adulthood. Although it has been widely accepted in learning different aspects of the (L2) linguistic system would be challenging (Amengual, 2024). The goal of any foreign language learner, especially those studying Indonesian, is to be able to speak the target language clearly, accurately, and fluently. Because of this, the criteria for a student's success in learning a foreign language include the student's ability to communicate effectively in the language (Susilowati et al., 2021).

In addition, learning Indonesian poses a special set of challenges for foreign learners, especially American learners, particularly to pronunciation. Due to the substantial phonetic variations between English and Indonesian, American BIPA learners encounter challenges when learning Indonesian vowels. The factor is phonological transfer from English to Indonesian, which causes learners who apply English phonetic patterns to Indonesian pronunciation. English vowels are often involve diphthongization, whereas Indonesian vowels are pure monophthongs and do not glide (Yule, 2020). As a result, American learners may produce Indonesian vowels with unintended glides or incorrect vowel length and tension.

The Indonesian vowel system relatively simple, with five primary vowels (/a/, /e/, /i/, /o/, and /u/) plus the schwa /ə/. This is in contrast to the sophisticated English vowel system, which incorporates vowel reduction and diphthongs. Despite this ease of use, phonological interference from their native tongue frequently causes American learners to struggle with appropriately producing these vowels. With an emphasis on how American BIPA students recognize Indonesian vowel phonemes in speech, this study aims to explore the challenges of American BIPA students encounter when pronouncing Indonesian vowels. The purpose of

the study is to determine frequent pronunciation realization, such as additions, deletions, and alteration of phonemes, and how these challenges affect overall intelligibility and fluency. There are two types of theoretical frameworks for pronunciation instruction, there are perception-based and production-based whether understanding or articulation of the target feature is considered the source of acquisition determines the classification (Lee et al., 2020).

The BIPA curriculum serves a variety of purposes in Indonesian education, educating students about the linguistic aspects of Indonesian (Asteria et al., 2023). One of the linguistic aspects that should be learned by American BIPA learners is phonology (Study of speech sound). The phonological systems of the learner's first language (L1) and the target language (L2) differ, which frequently causes pronunciation difficulties when learning a second language (L2). In this instance, switching from the more intricate English vowel system to the more straightforward Indonesian system presents a substantial linguistic shift for American students learning Bahasa Indonesia. Learners of second languages frequently find it difficult to produce phonemes that are absent from their first language (L1) because their preexisting phonetic categories impede their ability to learn new sounds. Vowel is frequently used as an open vocal tract to prevent the tongue from making contact with the palate of the mouth, teeth, or lips (Kasyulita & Niati, 2023). The primary causes of pronunciation problems include inadequate exposure to language settings, limited contacts with English speakers, and the phonetic and phonological variations in pronunciation between the English and other languages (Ercan & Demirezen, 2023). Few differences existed in the length or quality of Indonesian vowels are often pronounced consistently. Nonetheless, stress and diphthongization affect a large number of the over 20 vowel sounds in English (Yule, 2023).

Several previous studies have highlighted the phonological challenges experienced by BIPA learners from various linguistic backgrounds. (Salahuddin., 2023) analyzed pronunciation errors among beginner BIPA students at INCULS UGM. His research found common errors in Indonesian vowel production, including the addition of /y/ after nasal consonants, the omission of phonemes in diphthongs, and frequent confusion between /e/ and /ə/. These issues were attributed to the learners' unfamiliarity with Indonesian vowel distinctions and the influence of their first language phonology.

Similarly, (Salamah & Setiawati, 2023) explored articulatory phonetic errors among Thai BIPA learners and identified over 600 mispronunciations, particularly in vowels such as [a], [u], and gliding forms like [uwa]. Their findings revealed that tongue placement, lip movement, and interference from English all contributed to the errors, suggesting that learners from different L1 backgrounds often face similar phonetic challenges. Additionally, (Putri et al., 2023) studied BIPA students at Fatoni University and found that phonological errors including the alteration, omission, or addition of phonemes were closely related to both L1 interference and insufficient understanding of Indonesian pronunciation rules. The study emphasized the need for clearer phonological instruction in BIPA programs. These studies collectively underline the critical role of cross-linguistic interference in shaping the pronunciation habits of BIPA learners and highlight the necessity of focused pedagogical approaches to address vowel and consonant mispronunciations.

Based on the previous research, the urgency of this research is in the need to better understand the specific articulatory challenges faced by American learners. A detailed understanding of these challenges will support the development of more effective pronunciation teaching strategies within BIPA programs. Additionally, identifying the patterns of phoneme misrealization will help educators anticipate common errors and adapt their instruction accordingly.

When American learners apply English vowel articulation principles to Indonesian vowels, learners frequently mispronounce the vowels due to their complexity. In Bahasa Indonesia and English, the phoneme /a/ appears in words at three different locations there are initial, medial, and final. The phoneme /a/ in Indonesian writing system is represented by the letter [a], it is never articulated as [ae]. In contrast, the English phoneme /a/ has two major group words that indicate a variance, the English letter "a" can indicate multiple sounds, such as [ae] in "cat" or [ɑ:] in "father" (Andi & Alam, 2013).

This research has both theoretical and practical significance. Theoretically, it contributes to the fields of phonetics and second language acquisition by offering insights into cross-linguistic phonological influence. Practically, the findings will serve as a valuable reference for BIPA instructors in designing targeted pronunciation materials, and for future researchers exploring similar phenomena in second language phonology.

THEORETICAL BASIS

Phonological theory provides a foundational framework for understanding why American learners of Indonesian often encounter difficulties in vowel pronunciation. According to (Brown, 2014), second language learners tend to process and produce new phonemes through the filter of their first language (L1) phonological system. This process, known as negative transfer or interference, causes learners to substitute unfamiliar second language (L2) phonemes with the closest equivalents from their native language. Since American English has a more complex vowel system than Indonesian, American BIPA learners are likely to impose these features onto the relatively simpler and more stable Indonesian vowels, resulting in mispronunciations and altered phoneme realization.

The contrastive analysis hypothesis further supports this perspective by asserting that differences between the phonological systems of the L1 and L2 predict areas of potential difficulty in language learning. Indonesian employs a relatively symmetrical six-vowel system (/a/, /i/, /u/, /e/, /ə/, /o/), all of which are short, monophthongal, and phonetically stable (Sneddon et al., 2010). English, on the other hand, contains a far greater number of vowel phonemes many of which are diphthongized or involve significant articulatory complexity (Ladefoged & Johnson, 2015). As a result, American learners may instinctively pronounce Indonesian /o/ as [oo], or /e/ as [er], unintentionally introducing glides and vowel length not present in standard Indonesian. This misalignment highlights how structural differences in vowel inventories can impact learners' production accuracy. Unlike English, which has a complex vowel system with numerous monophthongs and diphthongs, Indonesian features a relatively simple vowel inventory consisting of six main vowels: /a/, /i/, /u/, /e/, /ə/, and /o/ (Sneddon et al., 2010). These systemic differences often lead to phonological interference, where learners unconsciously transfer vowel characteristics from their native language. Previous studies have found that English-speaking BIPA learners frequently struggle to differentiate and accurately produce the vowels /e/ and /ə/, as well as /o/ and /u/ (Aulia & Pratiwi, 2021);(Mahyumi, 2022).

Articulatory phonetics also plays a vital role in explaining these vowel production challenges. Producing accurate vowel sounds requires precise control of tongue height, tongue advancement, and lip configuration. (Ladefoged & Maddieson, 1996) point out that small articulatory deviations can result in perceptually distinct vowel qualities, especially in languages with limited vowel contrasts. Indonesian vowels typically require neutral tongue positions and minimal lip rounding, characteristics that contrast with the more exaggerated articulatory gestures found in American English. Without specific training to adjust these articulatory settings, American BIPA learners often retain their L1 habits, producing

Indonesian vowels with added rounding, tenseness, or diphthongization. This articulatory mismatch further complicates their ability to realize Indonesian vowel phonemes accurately.

Additional Phonemes where Indonesian vowels were often supplemented with additional phonetic features by American learners or the conversion of simple vowels into diphthongs, was one of the most prevalent problems. For example, rather than being realized as pure Indonesian [o], the vowel /o/ in words like *tolong* was typically realized as [ou], comparable to the English diphthong in *go*. Phoneme deletions when the schwa sound /ə/ was the most commonly detected phoneme deletion. Bahasa Indonesia does not have the phoneme /ə/ in the word final position, but the English phoneme appears in the word initial, medial, and final positions. The majority of vowel letters can be combined to spell the /ə/ in English (Andi & Alam, 2013).

Regarding phonemes alterations, there has been phoneme modification in various Indonesian vowels, including /a/, /i/, and /u/. The sound [ae] was frequently used to pronounce the vowel /a/, which is more characteristic of American English. Phonetic alterations are one type of phonological change in word pronunciation. This modification will give words a new sound according to (Diani & Azwandi, 2021). The cases of the phonological change have been a linguistic phenomenon and are often experienced by language learners who study a second language in Indonesia including Indonesian language and English. Phonological changes occur through various mechanisms such as assimilation, metathesis, elision, and suprasegmental changes as stated by (Fromkin et al., 2014). This theory emphasizes that phonological changes can occur both at the level of individual phonemes and within the overall system of the language. These processes function to adjust the language to the needs of articulation, perception, and understanding. Particularly in contexts involving second or foreign languages, learning precise pronunciation is essential to minimizing misunderstandings and improving linguistic ability. As a result, the main goal of learning pronunciation should be to assist students in producing comprehensible speech as stated by (Alsuhaibani et al., 2024). As a methodical representation of speech sounds, phonetic transcription is essential to language acquisition and communication. The literature on phonetic transcription sheds light on the significance of the technology and its possible applicability to the creation of FonBi, a phonetic transcription tool designed to help foreign speakers learn Indonesian (Nursaid et al., 2024).

RESEARCH METHOD

The study utilized a qualitative descriptive research approach to investigate the phonological challenges encountered by BIPA learners from America. Seven American students enrolled in the Universitas Negeri Malang BIPA program participated in the study. In-depth interviews were conducted with each participant to explore their experiences in learning Indonesian vowels and to obtain information on specific pronunciation challenges. Speech samples were also collected by asking participants to pronounce a range of Indonesian words and sentences containing various vowel phonemes. For a more detailed analysis, these voice samples were recorded.

To ensure the accuracy of phonetic data, all speech samples were transcribed using the FonBI website, which provides phonemic transcription based on standard Indonesian pronunciation. The primary objective of the transcription process was to identify occurrences of phoneme addition, deletion, and alteration, as well as to observe any underlying phonological processes reflected in the data. The transcribed data were analyzed by comparing participants' pronunciations with native Indonesian vowel standards in order to determine patterns of deviation and articulatory tendencies among the learners.

To enhance the trustworthiness of the study, several techniques of data validation were employed, including triangulation of data sources (interviews and speech recordings), member checking by asking participants to verify the interpretations of their responses, and peer debriefing involving consultation with fellow researchers to ensure objective analysis. The data were analysed thematically, and the results were interpreted in relation to established phonological theory and relevant previous studies. This multi-step analysis helped to ensure both the credibility and reliability of the research findings.

DISCUSSION

In this research, the findings show a total of 73 data of phoneme realization in vowel uttered by American BIPA learners, the amount of the differences categorized as mentioned in the table below.

Table 1. Vowels realization by American BIPA Learners

No.	Phoneme	Data	Realizations
1	Open front unrounded [a]	25	[ɪ], [ɛ], [ɔ], [ə], + [n], [ua], [i], [e]
2	Close front unrounded [i]	13	[a], [ə], [j], [ŋ], [ɛ]
3	Close back rounded [u]	11	[a], [o], [i], [ʊh], [ua], [ŋ]
4	Mid front unrounded [e]	3	[ə], [a], [i]
5	Mid central unrounded [ə]	15	[a], [i], [o], [u]
6	Near-close near-back rounded [ʊ]	5	[o], [a]
7	Close mid back [o]	1	[a]

The findings identified phoneme additions, deletions, and alterations as the three primary types of phonological changes committed by American BIPA learners. A number of Indonesian vowel phonemes, including /a/, /i/, /e/, /o/, /ə/, /ʊ/, and /u/. The most frequent problems with vowel realization are described in depth in the following sections.

Open Front Unrounded [a] Vowel realizations

Table 2 below presents examples of how the Indonesian open front unrounded vowel [a] was variably realized by American BIPA learners. The standard pronunciation of [a] was frequently altered, indicating systematic patterns of deviation and phonological processes.

In several cases, the vowel [a] was replaced with a lower or more central vowel, such as in *pirang* ['piran], which was pronounced as ['pireŋ], showing a vowel lowering process ([a] → [ɛ]). A similar vowel reduction is seen in *temannya* [tə'manɲa] becoming [tə'menɲa], and *kanan* ['kanan] becoming [kə'nan], reflecting centralization of the vowel to [ə]. These changes align with (Salahuddin., 2023) findings, which noted that BIPA learners often neutralize vowel contrasts, particularly in unstressed syllables, due to influence from the schwa sound in English.

Additionally, some learners inserted glides or additional sounds, a phenomenon that represents epenthesis or glide formation. For instance, *menguasai* [məŋua'sai] was realized as [məŋu'suwaj], involving the insertion of [w] and the diphthongization of [a] into [uwaj]. Likewise, *saya* ['saja] was pronounced as [se'ija], showing both vowel raising and diphthongization. These findings echo the work (Salamah & Setiawati, 2023) who documented similar glide formations among Thai BIPA learners, where vowels were frequently altered by inserting semivowels due to overgeneralization from English or their

native language phonology. More complex alterations such as metathesis, as seen in *berwarna* [bər'warna] pronounced [bərwər'na], and diphthong simplification in *saung* ['saʊŋ] becoming ['suaŋ], further indicate that learners struggle not only with vowel quality but also with the sequencing and structure of syllables. These types of errors suggest interference not only from L1 English but also from learners' internalized strategies of simplifying unfamiliar phonotactics, consistent with (Brown, 2014) theory of negative transfer in phonological acquisition.

Table 2. Sample of Open Front Unrounded [a] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	<i>Pirang</i>	['pɪraŋ]	['pɪrɛŋ]	[a] → [ɛ]	Vowel Lowering
2	<i>Dipajang</i>	[di'padʒaŋ]	[di'pandʒaŋ]	[a] → + [n]	Consonant Insertion (Epenthesis)
3	<i>Menguasai</i>	[məŋua'sai]	[məŋu'suwaj]	[a] → [uwaj]	Glide Formation
4	<i>Berwarna</i>	[bər'warna]	[bərwər'na]	[a] → [ə]	Metathesis
5	<i>Angkot</i>	['aŋkɔt]	['əŋkɔt]	[a] → [ɔ]	Vowel Substitution
6	<i>Saung</i>	['saʊŋ]	['suaŋ]	[a] → [ua]	Diphthong Simplification
7	<i>Temannya</i>	[tə'maŋna]	[tə'mɛna]	[a] → [ɛ]	Vowel Reduction
8	<i>Kanan</i>	['kanan]	[kə'nan]	[a] → [ə]	Vowel Centralization
9	<i>Saya</i>	['saja]	[se'ija]	[a] → [e'i]	Diphthongization
10	<i>Mem bayar</i>	[məm'baʒar]	[məmba'juar]	[a] → [ua]	Vowel Lengthening

Vowel Lowering

The data showed phoneme alterations in the word *Pirang* ['pɪraŋ] → ['pɪrɛŋ], where [a] is realized as [ɛ]. Vowel lowering involves shifting a higher vowel [a] to a lower vowel [ɛ]. This phenomenon may occur because English speakers often have a different vowel space where [ɛ] is more common in similar phonetic environments. Vowel lowering might simplify pronunciation for learners by mapping [a] to a more familiar vowel within their native phonological framework.

Consonant Insertion (Epenthesis)

Phoneme addition in the word *Dipajang* [di'padʒaŋ] → [di'pandʒaŋ], where [a] is realized with an added [n]. Epenthesis or consonant insertion involves adding an extra consonant to the word. In this case, the insertion of [n] may help English speakers align the word's structure with familiar phonological patterns. This process often occurs to make the pronunciation more intuitive or manageable within the constraints of their native language's phonology.

Glide Formation

In the word *Menguasai* [məŋua'sai] → [məŋu'suwaj], where [a] is realized as [uwaj]. The data showed phoneme alterations. Glide formation involves the transformation of a vowel into a glide (semi-vowel) like /w/ and /j/. English speakers might substitute [a] with glides as a way to simplify or adapt the vowel sound to a form more familiar to the phonological system, reflecting the influence of English vowel.

Metathesis

Phoneme alterations occurred in the word *berwarna* [bər'warna] → [bərwər'na], where [a] is replaced by [ə]. Metathesis refers to the transposition of sounds within a word. The replacement of [a] with [ə] might occur as American BIPA learners adjust the vowel to fit more comfortably within their phonological framework, reflecting a tendency to alter unfamiliar vowel sequences.

Vowel Substitution

In the data, phoneme alterations the word *Angkot* ['aŋkɔt] → ['ɔŋkɔt], where [a] is realized as [ɔ]. Vowel substitution involves replacing [a] with other vowels such as [ɔ] or [ə]. This process influenced by the learner's native vowel system, where alternative vowels are more familiar or easier to produce. The substitution of [a] with vowels more common in English highlights the impact of learners' first language on their pronunciation of Indonesian.

Diphthong Simplification

Phoneme alteration in the word *Saung* ['saʊŋ] → ['suan], where [aʊ] is simplified to [ua]. Diphthong simplification occurs when a complex vowel sound like [aʊ] is reduced to a simpler vowel combination [ua]. This simplification reflects a tendency to align with more straightforward vowel structures in English.

Vowel Reduction

The data showed phoneme alterations in the word *temannya* [tə'maŋna] → [tə'menja], where [a] is realized as [e]. Vowel reduction involves the change from a full vowel [a] to a more central vowel [e]. This process can be influenced by English phonological patterns, where [e] might be used as a neutral or reduced vowel in unstressed syllables or specific phonological contexts.

Vowel Centralization

The data showed phoneme alterations, in the word *kanan* ['kanan] → [kə'nan], where [a] is realized as [ə]. Vowel centralization refers to the shift from [a] to a central vowel [ə]. This adjustment might occur as English speakers adapt the vowel to fit a neutral position in their phonological system.

Diphthongization

Phoneme alterations in the data of the word *saya* ['saja] → [se'ija], where [a] is realized as [e'i]. Diphthongization involves changing a simple vowel [a] into a complex diphthong [e'i]. This process may reflect an attempt to accommodate the vowel to a structure more familiar to English speakers, who often use diphthongs in similar phonetic environments.

Vowel Lengthening

The data showed phoneme alterations in the word *membayar* [məm'bajar] → [məmba'juar], where [a] is realized as [ua]. Vowel lengthening occurs when a short vowel [a] is extended into a longer vowel combination [ua]. This adjustment may occur as learners adapt the vowel to suit the language's vowel system.

Close Front Unrounded [i] Vowel realizations

Table 3 illustrates the varied realizations of the Indonesian close front unrounded vowel [i] by American BIPA learners. Despite being a high and front monophthong that is generally stable in Indonesian phonology, the vowel [i] was frequently altered, substituted, or deleted in the learners' speech, indicating that it posed consistent articulatory and perceptual challenges. These data reflect the vulnerability of [i] to both segmental and suprasegmental interference, supporting earlier conclusions by (Salahuddin., 2023) that front high vowels are particularly susceptible to substitution and deletion when produced by non-native speakers whose L1 does not prioritize vowel clarity in unstressed positions.

Table 3. Sample of Close Front Unrounded [i] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	<i>Dijamin</i>	[di'dʒamin]	[di'dʒaman]	[i] → [a]	Vowel Substitution
2	<i>Yaitu</i>	[ja'itu]	['jatu]	[i] → []	Vowel Deletion (Elision)

3	<i>Pimpinan</i>	[pim'pinan]	[pəm'pinan]	[i] → [ə]	Vowel Centralization
4	<i>Nyaring</i>	['narɪŋ]	['narəŋ]	[i] → [a]	Vowel Lowering
5	<i>Mewarnai</i>	[mewar'nai]	[me'warnaj]	[i] → [j]	Glide Formation
6	<i>Air</i>	['air]	['ær]	[i] → [ɛ]	Vowel Raising
7	<i>Rawit</i>	['rawit]	['rawət]	[i] → [ə]	Vowel Reduction
8	<i>Sepandai</i>	[səpan'dai]	[sə'pandaŋ]	[i] → [ŋ]	Consonant Substitution

Vowel Substitution

Phoneme alteration occurred in the data of the word *dijamin* [di'dʒamin] → [di'dʒaman], where [i] is realized as [a]. Vowel substitution occurs when a high vowel [i] replaces a lower vowel [a]. This shift may be due to the learners' attempt to match the vowel sound with an easily producible vowel from their native language. In this case, [a] is more comfortable for English speakers to articulate than [i].

Vowel Deletion (Elision)

The data showed the sample of phoneme deletion in the word *yaitu* [ja'itu] → ['jatu], where [i] is omitted. Vowel deletion involves the removal of a vowel sound from a word. In this instance, the vowel [i] is elided. This may result from the learner's effort due to the influence of their native language.

Vowel Centralization

Phoneme alteration in the word *pimpinan* [pim'pinan] → [pəm'pinan], where [i] is realized as [ə] showed vowel centralization refers to the transformation of a vowel into a central vowel [ə] (schwa). This process may reflect the learners' tendency to simplify vowels to a more neutral position, where schwa is a common vowel in unstressed syllables.

Vowel Lowering

The data showed phoneme alteration in the word *nyaring* ['narɪŋ] → ['narəŋ], where [i] is realized as [a]. Vowel lowering involves shifting from a high vowel [i] to a lower vowel [a]. This may be a result of the learners' adjustment to a vowel sound that is easier to pronounce based on their native phonological patterns.

Glide Formation

Phoneme alteration showed *mewarnai* [mewar'nai] → [me'warnaj], where [i] is realized as [j]. Glide formation occurs when a vowel [i] changes into a glide [j]. This may happen as American BIPA learners adapt the vowel sound to fit more smoothly within the phonological structure of their native language, where glide sounds are more familiar.

Vowel Raising

In the result of the data *Air* ['air] → ['ær], where [i] is realized as [ɛ] it showed phoneme alteration. Vowel raising involves replacing a lower vowel [i] with a higher vowel [ɛ].

Vowel Reduction

The word *rawit* ['rawit] → ['rawət], where [i] is realized as [ə] involves the transition from a full vowel [i] to a reduced vowel [ə] as phoneme alteration. This can occur when learners simplify the vowel sound to fit within the unstressed position, reflecting a tendency to adapt unfamiliar vowel sounds to their native language's phonological constraints.

Consonant Substitution

In the finding the word *sepandai* [səpan'dai] → [sə'pandaŋ], where [i] is realized as [ŋ] showed phoneme alteration. Consonant substitution, where [i] is replaced by a consonant [ŋ], may reflect an adjustment in pronunciation to fit more closely with the learners' native phonological patterns.

Mid Front Unrounded [e] Vowel realizations

Table 4 highlights the phonological challenges American BIPA learners face when producing the Indonesian mid front unrounded vowel [e]. While this vowel is relatively common in Indonesian, its realization by American learners reveals frequent deviations due to first language (L1) phonological interference and articulatory habits influenced by English vowel patterns.

One common tendency is vowel centralization, as seen in the word *mewarnai* [mewar'nai], which was realized by learners as [mərwar'nai]. The shift from [e] to [ə] demonstrates how learners often neutralize unstressed mid vowels by replacing them with a schwa, which is a dominant vowel in unstressed syllables in English. This phenomenon is supported by (Brown, 2014) who noted that English speakers naturally gravitate toward centralized vowels in unstressed environments, contributing to their difficulty in maintaining the clearer vowel contrasts required in Indonesian.

Table 4. Sample of Mid Front Unrounded [e] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	<i>Mewarnai</i>	[mewar'nai]	[mərwar'nai]	[e] → [ə]	Vowel Centralization
2	<i>Belarang</i>	[bə'leran]	[bə'laran]	[e] → [a]	Vowel Substitution (Lowering)
3	<i>Didekat</i>	[di'dekat]	[di'dikat]	[e] → [i]	Vowel Raising

Vowel Centralization

Phoneme alteration occurred in the data in vowel centralization as evident when the vowel [e] is realized as [ə] (schwa). This process is observed in the word "*Mewarnai*" where [e] changes to [ə]. The centralization of schwa can make pronunciation more efficient for learners.

Vowel Substitution (Vowel Lowering)

In vowel substitution, specifically vowel lowering, a higher vowel [e] is replaced by a lower vowel [a]. This change is demonstrated in "*Belarang*," where [e] is replaced by [a], resulting in [bə'laran] rather than [bə'leran]. This data showed phoneme alteration. Lowering of the vowel can occur when the target vowel sound does not exist or is not clearly distinguished in the learner's phonetic inventory.

Vowel Raising

Phoneme alteration occurred in the data, vowel raising is the process where a lower vowel [e] is replaced by a higher vowel [i], as seen in "*Didekat*." American BIPA learner's pronunciation [di'dikat] replaces [e] with [i], showing a tendency to raise the vowel sound. This process is driven by the influence of the learner's native language, where vowel distinctions are made differently. Raising the vowel as a result of adjusting the vowel space to match the perceived vowel sounds in the target language.

Close Mid Back [o] Vowel realizations

Table 5 presents data on the realization of the Indonesian close-mid back vowel [o] by American BIPA learners. This particular vowel, while phonetically simple in the Indonesian language, presents challenges for L2 speakers whose native language vowel system does not feature a clear contrast between [o] and similar mid or low back vowels. In the case of the word *lomba* ['lomba], the American BIPA learner produced ['lamba], changing the vowel [o] to [a]. This represents a form of vowel centralization or lowering, which is a common error among English speakers learning Indonesian. The back rounded

vowel [o], which requires lip rounding and a higher tongue position, was replaced with the more open and unrounded [a], likely due to articulatory simplicity or L1 interference. According to (Brown, 2014) L2 learners tend to simplify vowel articulation when the target sound is not present in their native phonological system, which often leads to substitutions of more familiar vowels.

Table 5. Sample of Close Mid Back [o] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	Lomba	[ˈlomba]	[ˈlambda]	[o] → [a]	Vowel Centralization

Vowel Lowering

The data showed phoneme alteration in the primary phonological process observed is vowel lowering, where a higher vowel sound [o] is substituted with a lower vowel sound [a]. This is evident in the example "*Lomba*" where the pronunciation [ˈlomba] is pronounced as [ˈlambda] by American BIPA learners. This change reflects a shift from the mid-back rounded vowel [o] to the low-front unrounded vowel [a].

Mid Central Unrounded [ə] Vowel realizations

Table 6 presents data on how American BIPA learners realize the Indonesian mid-central unrounded vowel [ə], which is commonly found in unstressed syllables and serves as a crucial vowel in Indonesian phonology. The data reveal a variety of phonological processes affecting the production of [ə], including vowel lowering, substitution, and raising, which demonstrate the complexity of acquiring this vowel for learners whose native language is English. A prominent pattern in the data is vowel lowering or substitution from [ə] to the more open vowel [a], as observed in *sekarang* [səˈkaraŋ] realized as [saˈkaraŋ] and *mendengar* [məndəˈŋar] pronounced as [mənˈdaŋar]. This lowering tendency reflects a common challenge among L2 learners, who may perceive the schwa as an indistinct or “weak” vowel and replace it with a clearer, more open vowel like [a]. This finding aligns with (Brown, 2014) who noted that learners often replace reduced or centralized vowels with full vowels from their L1 phonetic inventory to increase intelligibility.

Table 6. Sample of Mid Central Unrounded [ə] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	<i>Sekarang</i>	[səˈkaraŋ]	[saˈkaraŋ]	[ə] → [a]	Vowel Lowering
2	<i>Mendengar</i>	[məndəˈŋar]	[mənˈdaŋar]	[ə] → [a]	Vowel Substitution
3	<i>Menikmati</i>	[məniʔˈmati]	[miniʔˈmati]	[ə] → [i]	Vowel Raising
4	<i>Mengembangkan</i>	[məŋəmˈbaŋkan]	[məŋamˈbaŋkan]	[ə] → [a]	Vowel Substitution
5	<i>Bergelombang</i>	[bərgəˈlombaŋ]	[bərgoˈlombaŋ]	[ə] → [o]	Vowel Centralization
6	<i>Penghuni</i>	[pəŋˈhuni]	[puŋˈhuni]	[ə] → [u]	Vowel Raising (Fronting)

Vowel Lowering

Phoneme alteration occurred in the word *sekarang* [sə'karəŋ] → [sa'karəŋ]. The schwa [ə] is replaced by a lower vowel [a]. This substitution reflects a common process where a more central vowel is replaced by a front vowel, which is easier for learners to articulate.

Vowel Substitution

The word *mendengar* [məndə'ŋar] → [mən'daŋar] is the phoneme alteration in the findings. In this example, the schwa [ə] is replaced by [a]. This substitution often results from learners simplifying vowel contrasts, possibly due to the influence of their native language vowel systems.

Vowel Raising

The data showed phoneme alteration, *menikmati* [məni? 'mati] → [mini? 'mati].

The schwa [ə] is raised to [i]. This process may be related to the learners' tendency to use more familiar high vowels, as high vowels are often more stable and less ambiguous.

Vowel Fronting

The finding of phoneme alteration in the word *mengembangkan* [məŋəm'baŋkan] → [məŋam'baŋkan]. The schwa [ə] is replaced by a front vowel [a] or [i]. This fronting was influenced by the learners' native language vowel space, which does not include the schwa.

Vowel Centralization

Phoneme alteration occurred in the word *bergelombang* [bərgə'lombaŋ] → [bərgo'lombaŋ]. The schwa [ə] becomes a back vowel [o]. This process could be driven by the learners' attempts to align the vowel sounds with those more common in the phonetic inventory.

Vowel Raising (Fronting)

The data of the word *penghuni* [pəŋ'huni] → [puŋ'huni] happened phoneme alteration. The schwa [ə] is replaced by a high back vowel [u]. This change reflects a pattern where central vowels are replaced by high vowels, possibly due to ease of articulation.

Near-back Near-Close [ʊ] Vowel realizations

Table 7 shows how American BIPA learners realize the Indonesian near-back near-close vowel [ʊ]. This vowel, which is relatively uncommon and acoustically subtle in English compared to Indonesian, poses significant challenges for learners. The data reveal several phonological processes, including vowel lowering, substitution, and fronting, all of which alter the original vowel quality. The vowel fronting phenomenon, such as the realization of *bus* [bʊs] as [bas], may suggest interference from English phonotactic patterns where the vowel [ʊ] is less frequent and sometimes merged with other vowels in rapid speech. (Salahuddin., 2023) supports this by highlighting that vowel fronting and substitutions are common errors among American BIPA learners due to the differing vowel systems and syllable structures between English and Indonesian.

Table 7. Sample of Near-back Near-Close [ʊ] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	<i>Saung</i>	['saʊŋ]	['saʊŋ]	[ʊ] → [o]	Vowel Lowering
2	<i>Maupun</i>	[ma'ʊpʊn]	[ma'ʊpʌn]	[ʊ] → [a]	Vowel Substitution
3	<i>Bus</i>	[bʊs]	[bas]	[ʊ] → [a]	Vowel Fronting
4	<i>Kapur</i>	['kʌpʊr]	['kʌpʌr]	[ʊ] → [a]	Vowel Substitution

Vowel Lowering

Phoneme alteration occurred in the word *saung* ['saʊŋ] → ['saʊŋ]. The back semi-close vowel [ʊ] is replaced by a lower vowel [o]. This process, known as vowel lowering, demonstrates a shift from a higher, more rounded vowel to a more open and less rounded vowel.

Vowel Substitution

The data revealed the word *maupun* [ma'upon] → [ma'upan] as phoneme alteration. In this example, the vowel [ʊ] is substituted by [a]. This form of vowel substitution reflects a broader tendency among learners to replace fewer familiar vowels with those that are more common or phonetically easier for them to produce.

Vowel Fronting

Phoneme alteration appeared in the word *Bus* [bus] → [bas]. The back vowel [ʊ] is replaced by a front vowel [a]. This vowel fronting reflects a significant shift from a back-rounded vowel to a front-unrounded vowel, which may be easier for learners to produce based on their native language's vowel system.

Vowel Substitution

In the data can be seen phoneme alteration in the word *kapur* ['kapʊr] → ['kapar]. The vowel [ʊ] is replaced by [a]. This substitution is consistent with the general trend of vowel substitution observed in other examples, where learners replace fewer familiar vowels with more common ones in their phonetic inventory.

Close back rounded [u] Vowel realizations

Table 8 presents a range of vowel changes involving the Indonesian close back rounded vowel [u] as realized by American BIPA learners. The data show that learners commonly replace [u] with other vowels or consonants, indicating difficulty in accurately articulating this vowel, which has a different distribution and phonological status in English. For instance, in the word *sejuk* [sə'dʒuʔ], the learner's pronunciation [sə'dʒaʔ] exhibits vowel lowering, substituting [u] with the more open vowel [a]. This aligns with (Brown, 2014) theory that L2 learners tend to assimilate unfamiliar target-language sounds into the closest available L1 phoneme category. Similarly, *ruang* ['ruaŋ] being pronounced as ['roaŋ] demonstrates vowel substitution, with [u] replaced by [o], a vowel more prominent in American English.

Table 8. Sample of Close back rounded [u] phoneme realization

No.	Word	Indonesian Pronunciation	American BIPA Learner Pronunciation	Vowel Change	Phonological Process
1	<i>Sejuk</i>	[sə'dʒuʔ]	[sə'dʒaʔ]	[u] → [a]	Vowel Lowering
2	<i>Ruang</i>	['ruaŋ]	['roaŋ]	[u] → [o]	Vowel Substitution
3	<i>Supaya</i>	[su'paja]	[si'paja]	[u] → [i]	Vowel Raising
4	<i>Itu</i>	['itu]	['itoh]	[u] → [oh]	Consonant Addition
5	<i>Bumbu</i>	['bumbu]	['bumbuŋ]	[u] → [ŋ]	Consonant Substitution

Vowel Lowering

The data revealed phoneme alteration, vowel Lowering in several cases, high back vowels /u/ were substituted with lower vowels such as /a/ or /o/. For instance, in the word *sejuk* [sə'dʒuʔ] → [sə'dʒaʔ], where /u/ is replaced by /a/.

Vowel Substitution

Phoneme alteration from the data showed vowel substitution involves replacing Indonesian vowels with those from English, reflecting differences in vowel inventories between the two languages. *Ruang* ['ruaŋ] → ['roaŋ], where /u/ is replaced by /o/. English speakers often find it challenging to produce or distinguish between high-back vowels like /u/ and other vowels that

may not exist in their native language. This results in a tendency to substitute /u/ with vowels that are easier to articulate, such as /o/.

Vowel Raising

The data revealed phoneme alteration, another common process is vowel raising, where the back vowel /u/ is replaced by a higher vowel such as /i/. For example, *Supaya* [su'paja] → [si'paja], where /u/ is replaced by /i/. This vowel raising can be attributed to the influence of English phonological patterns. In English, vowels in similar positions might be pronounced differently, often involving a shift towards higher or more fronted positions. Thus, English speakers might unconsciously apply these familiar vowel qualities when speaking Indonesian.

Consonant Addition

Phoneme addition in *itu* ['itu] → ['itoh], where an additional /h/ is added after /u/.

The addition of /h/ might be a strategy to close the syllable or reflect a pattern found in English, where glottal stops or additional consonants often appear at the end of syllables.

Consonant Substitution

Bumbu ['bumbu] → ['bumboŋ], where /u/ is replaced by the nasal consonant /ŋ/.

This substitution reflects a tendency to replace unfamiliar vowels with sounds that are more common in English, particularly in similar phonological environments. English speakers might use nasal consonants as a substitute for vowels they find difficult to pronounce.

The results of this study are specifically on the impact of learners' first language on their second language's phonological acquisition related to the pronunciation of second languages. When pronouncing Indonesian vowels, American BIPA learners appear to be significantly influenced by their native English vowel system, as evidenced by the frequent occurrence of phoneme additions, deletions, and alterations. Learners' overall fluency is impacted by this transfer from English to Indonesian. As stated by a previous study (Salamah & Setiawati, 2024) numerous factors, including articulators' proximity or resemblance, articulation sites, air routes, vocal cord movement, and especially interference from the mother language, might lead to these challenges. Similar to how English vowel reduction patterns are mirrored in Indonesian, schwa and other unstressed vowels have been eliminated. Vowel reduction or deletion frequently occurs in unstressed syllables in English, leading to weak variants of vowels that are either central schwa sounds or deleted entirely. This tendency was noticeable in the way American BIPA learners pronounced Indonesian words, especially those with several syllables. Alterations in phonemes occurred most commonly in the data, emphasizing even more how English phonological patterns affect learners from America. To adapt to the more complex and variable vowel sounds in English, these simple and consistent vowels from Indonesian are changed (Yule, 2023). Consequently, even when learners' grammar and vocabulary are correct, their speech sounds very different from native speakers. The ability to correctly pronounce specific phonemes is impacted by the phonetics and phonological patterns of their mother tongue as stated by (Suhery et al., 2024). According to (Fadillah, 2020) discuss the influence of external factors on an individual's ability to pronounce foreign words fluently. These factors include exposure to the target language, educational background, and foreign language teaching. It does not decrease their significance compared to the internal influences, even though they are classified as external impacts. According to (Masykar et al., 2023) when learning a new language, L2 learners often filter the target language sound through their current sounds. As a result, during the early stages of their growth, non-native sounds may resemble certain native vowels. As stated by (Wardana et al., 2022) phonetic articulation and the phonological process are two significant challenges in the learning of speech sounds by learners. However, lexical ambiguity might result from improper phonetic articulation.

CLOSING

This study set out to identify and analyze the challenges faced by American BIPA learners in pronouncing Indonesian vowels, focusing on the phoneme realization of each vowel category. The findings show that American learners experience consistent difficulties across almost all Indonesian vowel types, including [a], [i], [e], [o], [u], [ə], and [ʊ]. Each vowel exhibited a range of phonological processes, such as vowel substitution, vowel lowering or raising, diphthongization, centralization, and even consonant insertion or replacement. These processes demonstrate that learners often rely on their first language (English) phonetic system, causing mismatches in articulation and perception of Indonesian vowel sounds.

Specifically, the [a] vowel was frequently lowered or diphthongized into [ɛ], [e], or [ua], and [i] was often centralized to [ə] or replaced by [a], indicating that American learners struggle with distinguishing Indonesian vowel height. Meanwhile, the [e] and [o] vowels were occasionally raised or substituted by more familiar English vowel sounds, reflecting perceptual confusion. The schwa [ə] showed a strong tendency to be replaced by [a], [i], or [o], suggesting that its reduced and central quality is not salient enough for learners. Additionally, the back rounded vowels [u] and [ʊ] were mis realized as [a], [o], [i], or even replaced with consonants, showing instability in how these vowels are represented and produced.

These findings confirm that the primary cause of pronunciation errors is first language interference, especially when the learners' native phonemic inventory lacks the exact match to Indonesian vowels. As stated by (Brown, 2014) and supported by (Salahuddin., 2023) learners often assimilate unfamiliar L2 sounds into the closest available L1 categories, which leads to systematic mispronunciations. Furthermore, errors such as glide formation and diphthong simplification suggest that even when learners approximate Indonesian vowels, they may overcorrect or use L1 strategies that are incompatible with Indonesian phonotactics. This reinforces the need for tailored pronunciation instruction in BIPA programs that includes perception training, explicit contrastive phonetic explanation, and regular corrective feedback.

In conclusion, the results of this study highlight the importance of addressing vowel articulation challenges in BIPA learning for American students. The phonological processes identified reflect both perceptual and articulatory struggles, indicating that mastering Indonesian vowels requires focused phonetic awareness beyond vocabulary and grammar. By recognizing the typical patterns of mispronunciation and their underlying causes, language educators can develop more effective pedagogical strategies to support L2 vowel acquisition. These strategies should involve auditory discrimination tasks, minimal pair practice, and articulatory training, which are essential for helping learners achieve more native-like pronunciation and successful communication in Indonesian.

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