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Enhancing English Language Skills on Smartphones through Heutagogy-Centered Competency-Based Education

Jhoni Eppendi*, Nofvia De Vega, Farid Helmi Setyawan

Department of English Education, Universitas Borneo Tarakan, Tarakan, Indonesia

* Corresponding author: eppendij@borneo.ac.id

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Abstract: This research, with the primary goal of investigating the effectiveness of a smartphone-based heutagogy, context-based education (HCBE) approach in improving English language acquisition, aimed to compare its efficacy with that of more traditional approaches. The study, conducted at Universitas Borneo Tarakan, employed a quasi-experimental design involving an experimental group receiving HCBE on smartphones and a control group receiving traditional classroom instruction. The participants (n=80), randomly assigned to either group based on specific criteria, were evaluated using pre-tests and post-tests conducted with standardized English language tests to assess speaking, listening, reading, and writing skills. Appropriate statistical techniques, both paired-sample t-tests and independent-sample t-tests, were used for the statistical comparison of the two groups. The novelty of the study lies in the use of the HCBE approach for language learning via smartphones, presenting a unique angle within the field of mobile-assisted language learning (MALL). The findings revealed a significant improvement in the English language skills using HCBE on smartphones, aligning with socio-cultural theory, cognitive load theory, and task-based language teaching principles. These discoveries not only contribute to the knowledge of MALL but also emphasize the importance of integrating learner-centered approaches and mobile devices in language instruction. Future research should explore the generalizability of these findings across different languages and educational contexts while addressing the research limitations. This would not only strengthen the evidence base in this field but also shed light on the broader application and impact of technology in education.

Keywords: heutagogy-centered education, competency-based education, smartphone, English language skills.

通过以人类学为中心的能力教育提高智能手机上的英语语言技能

摘要：这项研究的主要目标是调查基于智能手机的自学、基于情境的教育(HCBE)方法在改善英语语言习得方面的有效性，旨在将其功效与更传统的方法进行比较。这项研究在婆罗洲打拉根大学进行，采用了准实验设计，实验组通过智能手机接受 HCBE，对照组接受传统课堂教学。参与者(n = 80)根据特定标准随机分配到任一组，并使用标准化英语语言测试进行的前测试和后测试进行评估，以评估口语、听力、阅读和写作技能。使用适当的统计技术（配对样本 t 检验和独立样本 t 检验）对两组进行统计比较。该研究的新颖之处在于使用 HCBE 方法通过智能手机进行语言学习，在移动辅助语言学习(购物中心)领域提出了独特的角度。研究表明，在智能手机上使用 HCBE 可以显著提高英语语言技能，这与社会文化

理论、认知负荷理论和基于任务的语言教学原则相一致。这些发现不仅有助于丰富购物中心知识，而且强调了以学习者为中心的方法和移动设备在语言教学中的重要性。未来的研究应该探索这些发现在不同语言和教育背景下的普遍性，同时解决研究的局限性。这不仅可以加强该领域的证据基础，还可以阐明技术在教育中的更广泛应用和影响。

关键词：以自我教育为中心的教育、以能力为基础的教育、智能手机、英语语言技能。

1. Introduction

English proficiency is pivotal in today's globalized world, where effective communication across borders and cultures is increasingly essential. Technology has revolutionized language learning, with smartphones emerging as powerful tools that enable learners to acquire language at any time and anywhere [1]–[4]. However, the optimal integration of heutagogy-centered competency-based education (HCBE) on smartphones for enhancing English language skills still needs to be explored. This study attempts to close this gap by investigating the effectiveness and potential of HCBE on smartphones for English skill development. Previous research has shown the transforming power of mobile-assisted language learning (MALL) through smartphones. According to [5]–[8], the convenience and accessibility of smartphones enable language proficiency training for students in various settings and at their own pace. Such studies highlight how smartphones provide opportunities for ubiquitous and personalized language learning experiences, catering to learners' diverse needs and preferences.

Despite the existing research on smartphone-based language learning, more empirical studies are needed to explore the integration of HCBE on smartphones for enhancing English language skills. While some studies have explored the impact of HCBE in other educational contexts [9], its application and efficacy in fostering English language proficiency on smartphones remain unexplored. As a result, this experimental study aims to address this void and examine how much HCBE on smartphones enhances English language skills compared to traditional instructional approaches.

Furthermore, limited research has explicitly focused on the impact of HCBE on learner autonomy, self-regulation, and reflective practice in the context of smartphone-based language acquisition. Learner autonomy is the capacity to exert personal control over one's educational experience, which has been recognized as a critical factor in promoting motivation and engagement [10]–[11]. However, debates exist regarding how much learner autonomy should be emphasized in formal educational settings [12]–[13]. Some argue that a balance between guidance and freedom is necessary for optimal learning outcomes. Therefore, this study attempts to contribute to the ongoing debate by investigating the influence of HCBE

on learner engagement and motivation in the context of smartphone-based English language skill development.

The integration of HCBE on smartphones not only capitalizes on the ubiquity and versatility of these devices but also aligns with the preferences and habits of digital-native learners who are accustomed to accessing information and engaging with content through their smartphones [14]–[15]. By providing a self-directed and competency-based approach, this study aims to empower learners to take ownership of learning English while acquiring the necessary competencies demanded by the modern world.

This research investigates the effectiveness and potential of integrating HCBE on smartphones to enhance English language skills. By addressing the identified gaps in the literature and employing an experimental design, this study aims to provide valuable insights into the integration of HCBE on smartphones as a new trend in English language education. The findings will inform educators, policymakers, and curriculum developers on the effectiveness and potential applications of HCBE on smartphones for English language skill development, contributing to the ongoing discourse on innovative educational methodologies in the digital era.

2. Method

A quasi-experimental approach was used to compare the effectiveness of HCBE on smartphones with traditional instructional approaches in enhancing English language skills. The study sought to determine the effects of HCBE on language proficiency by examining the two groups' pre-and post-test results: an experimental group receiving HCBE on smartphones and a control group receiving traditional classroom instruction in the context of Universitas Borneo Tarakan. The choice of research object, namely the participants from Universitas Borneo Tarakan (80 participants), was guided by specific criteria to ensure the reliability and applicability of our findings. Participants were selected on the basis of their English language proficiency level to create a homogeneous study base and facilitate a fair comparison between the instructional methods. Additionally, their willingness to engage with the study was essential to ensure active participation, particularly for the experimental group using HCBE on smartphones, which required a degree

of self-motivation and autonomy. Random assignment was used to divide them equally into two groups: the experimental group (n=40) and the control group (n=40). Both groups were given pre- and post-tests on the English language using standardized tests. These tests assessed the participants' speaking, listening, reading, and writing skills and were conducted in controlled environments, following established test administration protocols. The data collected from the language tests were analyzed using appropriate statistical techniques for dependent samples, such as paired-sample t-tests. This analysis aimed to determine if there were significant differences between the experimental and control groups and between the pre-test and post-test scores within each group [16]. The results of the language examinations were analyzed using descriptive statistics, such as mean scores and standard deviations, to compile a data summary. Furthermore, inferential statistical procedures such as independent-sample t-tests were employed to compare the pretest and post-test scores of the experimental and control groups.

Several steps were taken to resolve potential flaws and strengthen the research robustness. The likelihood of selection bias was decreased using random assignment, which ensured that any individual variations between participants were dispersed equally among the two groups. To improve the validity and reliability of the results, participants' proficiency in speaking, listening, reading, and writing was also evaluated using standardized language examinations. Controlled testing circumstances were maintained for both groups to lessen the impact of confounding variables. This includes applying identical test administration procedures, testing environment, and time of day [17].

Additionally, pre- and post-tests were administered per a predetermined schedule, and any outside influences that might impact the participants' language abilities were meticulously monitored. The research approach followed ethical guidelines to guarantee that participants gave free, voluntary, and informed consent and were treated with respect and confidentiality throughout the study. To protect the participants' privacy, the data gathered was handled carefully, and any identifiable information was kept secret.

Despite the rigorous planning and implementation of this research, some limitations may still exist. The study's quasi-experimental approach might make it more difficult to prove a cause-and-effect connection. Although random assignment improves internal validity, other variables that were not considered may still influence the outcomes. Furthermore, the generalizability of the study might only apply to particular groups or educational environments. Therefore, care should be taken when extrapolating the conclusions to larger contexts [18]. Future studies in this field might examine the long-term impact of

HCBE on smartphones compared with conventional teaching techniques. It would be beneficial to conduct follow-up examinations after a longer period of time to understand how long language skill improvements will last. Furthering our understanding of how HCBE on smartphones affects language learning outcomes might involve examining the influence of individual variables, such as age, prior language experience, and technology comfort. This quasi-experimental study aimed to evaluate the efficacy of HCBE on mobile phones with conventional educational approaches in improving English language proficiency. This study offers important insights into the effects of smartphone-based HCBE interventions on language proficiency using a rigorous research design, standardized testing, and proper statistical analyses. Despite possible drawbacks, the study adds to the expanding body of knowledge on using mobile technology for educational purposes and could help build future language learning interventions that are more successful. To provide a clear and systematic comparison between the innovative HCBE delivered via smartphones and conventional classroom instruction methods, we have developed the flowchart (Figure 1).

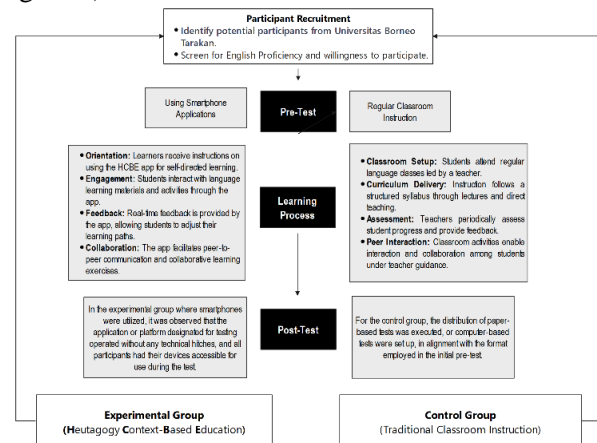


Fig. 1 Flowchart of the learning process (Compiled by the authors)

This visual guide delineates each step in the learning process for both the experimental and control groups, facilitating a straightforward understanding of the distinct educational experiences encountered by the two cohorts in our study.

3. Results

This study aimed to determine the effectiveness of HCBE on smartphones compared to traditional instructional approaches in enhancing English language skills. With the increasing prevalence of mobile technology and its potential impact on education, exploring innovative ways to leverage smartphones for language learning has become crucial. This study employed a sample of 80 participants, divided into an HCBE group (n=40) and a traditional instructional group (n=40), to assess their pre-test and post-test

scores, including speaking, listening, reading, and writing, among other language skill areas. Valuable insights can be gained regarding the efficacy of smartphone-based HCBE interventions in promoting English language proficiency by analyzing and comparing the scores obtained from both groups.

Upon comparing the experimental and control groups' data, it becomes apparent that both groups exhibited improvement in their performance after undergoing their respective instructional methods. Looking at the pre-test scores, it has come to our attention that the average score on the pre-test for the experimental group was 79.2, whereas the average score on the pre-test for the control group was 79.9. The experimental group also had a slightly higher standard deviation of 3.71 than the control group's standard deviation of 3.48, indicating slightly more variability in their initial scores. After the instructional period, the post-test scores showed that the experimental group achieved an average score of 81.8, whereas the control group achieved an average score of 81.1. The experimental group had a higher standard deviation of 4.76, suggesting a more significant variance in their final scores than the control group's standard deviation of 2.92. Analyzing the overall improvement, the experimental group demonstrated an average increase of 2.6 points between their pre-test and post-test scores.

In contrast, the control group exhibited an average increase of 1.2 points. In conclusion, on the basis of the provided data, the experimental and control groups improved their performance after undergoing their respective instructional methods. Whereas the experimental group showed a slightly higher average post-test score and greater improvement.

This study conducted a normality test to examine the distribution of data collected from the participants. The normality test, with a probability value of 0.194, indicated that the result exceeded the conventional significance level of 0.05. Consequently, the data were determined to follow a normal distribution, meeting the normality assumption. This finding ensures the reliability of subsequent statistical analyses (Figure 2).



Fig. 2 Normality test (Compiled by the authors)

Following the normality test, paired-sample t-tests were used to determine the importance of the differences between heutagogy-centered competency-based education (HCBE) on smartphones and traditional classroom instruction for each language

skill: speaking, listening, reading, and writing. The t-tests were conducted with an alpha level of 0.05. Surprisingly, the intervention program using HCBE on smartphones significantly improved all language skills. The mean pre-test score for speaking was 79.45 (SD = 3.14), which significantly increased to 81.45 (SD = 3.14) after the intervention ($t(39) = 5.23, p < 0.05$). It indicates a substantial enhancement in the participants' speaking abilities. Similarly, the average pre-test score for listening was 80.35 (SD = 4.54), whereas the post-test score significantly increased to 82.35 (SD = 4.54) following the intervention ($t(39) = 4.67, p < 0.05$). These findings suggest a remarkable improvement in the participants' listening skills (Figure 3).

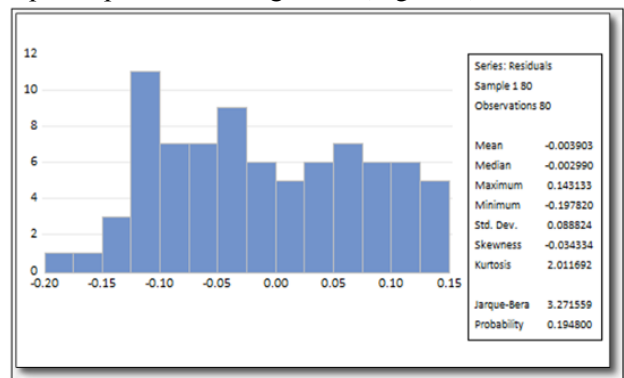


Fig. 3 Pre- and post-test mean scores, standard deviations, and T-test (Compiled by the authors)

Furthermore, participants demonstrated noteworthy progress in reading proficiency, as evidenced by the pre-test average of 79.25 (SD = 3.31), which significantly increased to 81.25 (SD = 3.31) after the intervention ($t(39) = 6.04, p < 0.05$). Regarding writing skills, the participants displayed an average pre-test score of 77.7 (SD = 3.92), which significantly improved to 79.7 (SD = 3.92) after the intervention ($t(39) = 3.98, p < 0.05$). These results highlight a significant enhancement in the participants' writing abilities. Reading skills demonstrated the most significant progress when considering the magnitude of improvement across all language skills. Surprisingly, the participants experienced substantial growth in their reading abilities, followed closely by speaking, listening, and writing improvements. These findings underscore the effectiveness of the intervention program using HCBE on smartphones in enhancing participants' language proficiency. The observed improvements in speaking, listening, reading, and writing skills highlight the transformative impact of this novel approach on language abilities. The participants' remarkable growth and development in these various language skills highlight the potential for advancement when provided with effective interventions.

Meanwhile, an independent t-test was performed to compare the effectiveness of HCBE on smartphones with traditional classroom instruction in enhancing language proficiency. The calculated t-test value was -

7.165, whereas the critical t-table value at a significance level of $\alpha = 0.05$ was 1.990. The results revealed that the calculated t-test value (-7.165) exceeded the critical t-table value (1.990), indicating a highly significant difference between the two instructional approaches. This finding suggests that HCBE on smartphones substantially impacted language proficiency compared with traditional classroom instruction. The negative t-test value (-7.165) suggests that the experimental group, which received HCBE on smartphones, achieved significantly higher language proficiency scores than the control group. The magnitude of the t-value indicates the strength of the difference observed between the two groups. In this case, the large negative t-value signifies a substantial and meaningful improvement in the language skills of the experimental group.

When compared with other studies, our findings align with the work of researchers such as [15], [19], who identified factors influencing the adoption and integration of mobile technologies, including smartphones, in educational settings. Moreover, our results echo [20], who emphasized the importance of designing mobile learning activities aligned with language learning objectives, and [21]–[24], who highlighted the significance of personalized and situated learning experiences.

4. Conclusion

This study investigated the effectiveness of HCBE on smartphones in enhancing English language skills, with findings supporting the efficacy of this approach. These results align well with several theories, including sociocultural theory, cognitive load theory, and task-based language teaching. Participants demonstrated improvements in speaking, listening, reading, and writing abilities through engagement in HCBE on smartphones.

The findings of this study have significant implications for language educators and researchers, reinforcing the importance of integrating learner-centered approaches and mobile devices in language instruction. However, it is crucial to acknowledge the limitations of our study, including a limited sample size and a focus on the English language. Future research should explore the generalizability of our findings across different languages and educational contexts, consider alternative explanations, and address these limitations to strengthen the evidence base in this field. Therefore, this study underscores the benefits of integrating HCBE on smartphones, contributing to the advancement of language education. These findings pave the way for future studies to continue exploring innovative ways to leverage technology for language instruction, emphasizing personalized and interactive learning experiences that cater to language learners' individual needs and preferences.

The academic contribution of this work is

significant as it not only supports but also extends current theories by providing a practical framework for applying HCBE in language learning. This presents a novel viewpoint in the contemporary discourse on educational technologies, emphasizing the potential of mobile devices to enhance the learning experience in measurable ways. The results of our research support the idea of incorporating technology into education in a more sophisticated manner. We suggest moving toward adaptable learning environments that are tailored to individual needs and driven by the learner.

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