Heutagogical-based ICALL environment: A framework to develop students' capability

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The use of Intelligent Computer Assisted Language Learning (ICALL) in foreign language learning holds great promises, but the identification of rigorous design principles to develop students' capability through practical learning design are still insufficient. As capability concerns how people use their competencies in the unknown rather than in familiar situations, ensuring students' capability development becomes crucial in today's complex, dynamic, and rapidly changing system of modern society. One critical question to firstly answer regarding the numerous variety and available options of ICALL applications is what and how to choose appropriate and relevant ICALL applications which would effectively enhance students' capability. This paper proposes a framework for the intervention design of the ICALL learning environment to develop EFL students' capability based on the pedagogy-andragogy-heutagogy continuum and the authentic learning framework.

Keywords: authentic learning, capability, EFL, heutagogy, ICALL.

A Transformation from competency to capability

Along with the emergence of artificial intelligence which has been ubiquitous and brought many fundamental changes in today's life, Intelligent Computer Assisted Language Learning (ICALL) has been one focal point in language education. The use of ICALL in foreign language learning is inevitable and has transformed the way people learn the target language. As the development of ICALL has been driven by advances in natural language processing, machine learning, and other AI technology, these technologies enable the ICALL system to analyze and understand the learner's input, assess their language skill, and provide feedback that is tailored to their individual needs. Many studies have reported the benefits of ICALL system use for language learning. Most of them discussed how the ICALL system can provide a personalized experience (Chen et al., 2021; Khudhair Abbas Ahmed, 2016; van der Vorst & Jelicic, 2019; Wei et al., 2021; Zhou et al., 2018), adapt to the learner's need, and level of proficiency (Almohammadi et al., 2017; Chaplot et al., 2016; Gan et al., 2019; Hafidi & Bensebaa, 2013; Kim & Kim, 2020), and offer immediate feedback on grammar, vocabulary, pronunciation, and other aspects of language use (Franco et al., 1997; Hincks, 2003; Moustroufas & Digalakis, 2007; Muhammad et al., 2020; Ruan et al., 2021)

In addition, the advancement of various generative Artificial Intelligence (AI) technologies holds great promises to enhance and accelerate heutagogical approaches which is critical to foster students' capability. Hase and Kenyon (2007, p.112) describe, "Heutagogy is concerned with learner-centred learning that sees the learner as the major agent in their own learning, which occurs as a result of personal experiences". Identifying capability as different attribute from competencies, Hase and Kenyon (2007) argue that capability concerns with how people use their competence in the unknown rather than in familiar situation and able to manage the dynamic and uncertainty of real-word context. In other words, while competencies deal with effective functioning in known context with prior ability, capability helps to effectively handle and adapt with the unknown situation that extend beyond competence. This notion becomes critical as today's modern society is a complex, dynamic, and rapidly changing system with emergent properties, interconnectedness, adaptability, diversity, uncertainty, and self-organizing mechanisms including in workplace setting. In relation to today's extensive growth of AI, Blaschke et al., (2021) believe that the well-handled use of internet and technology in higher education context might bring wider opportunities of implementing the heutagogical approach which would align with the crucial need of preparing capable students in modern society. They assert that the broader and borderless access of information through the vast development of technology, including the emergence of AI, provide students with a variety of resources, the identification of current learning, and focus on areas of need and interest.

Despite the various ICALL systems application and their immense potential to improve teaching and learning, their effectiveness relies heavily on the user's expertise and knowledge of using it. A phenomenon found during school closure due to the COVID-19 pandemic was that most teachers, especially in rural areas, experienced difficulties conducting online learning, not only because of infrastructure issues but also because of their lack of knowledge of optimizing learning technology for online classroom activities (Agung & Surtikanti, 2020;

Amrullah et al., 2022; Dhawan, 2020; Elumalai et al., 2020; Fauzi & Sastra Khusuma, 2020; Mahyoob, 2020; Nambiar, 2020; Octaberlina & Muslimin, 2020; Pratolo & Solikhati, 2020; Rasmitadila et al., 2020). Therefore, the practical benefits of ICALL do not guarantee effective teaching and learning unless the teachers are properly trained and equipped with the necessary skills and knowledge to effectively integrate technology into their teaching practice. Cochrane's (2014) framework of six critical success factors for mobile learning implementation highlights that the success of ICALL system implementation in teaching and learning activities mostly relies on teacher factors. Cochrane (2014) believes that teachers' technological pedagogical content knowledge in relation to the pedagogical integration of the technology into the course and assessment, teachers modelling of the pedagogical use of the tool, a supportive learning community, appropriate choice of devices and software, technological and pedagogical support, and sustained interaction that facilitates the development of ontological shifts, both for the lecturers and the students are all crucial for the successful integration of ICALL in the learning activity.

In their policy statement, Selwyn and Heffernan (2021) provide guidelines to guide and inform teachers' choice when working with digital technologies. They argue that teachers should considers several points regarding the pedagogical implication of the software: what pedagogical model that the software promotes, the assumption made about students and learning, the software's core values, and in what ways the software is different from other existing method. Concerning those points, one critical question to firstly answer regarding the numerous variety and available options of ICALL applications is what and how to choose appropriate and relevant ICALL applications which would effectively develop students' capability. Theoretical frameworks that might help answer this question are the authentic learning and learner-centric ecology of resources.

Authentic learning and learner-centric ecology of resources

Herrington et al. (2014) state that authentic learning is "a pedagogical approach that situates learning tasks in the context of real-world situation" which provides students with learning opportunities to experience problem-solving challenges as they will face in real-life situation. In previous research, Herrington (2006) provided a critical framework of the characteristics of situated learning which underpins the evolving of authentic learning: an authentic context that reflect the way the knowledge will be used in real life, authentic activities, access to expert performances and the modelling of the processes, multiple roles and perspectives, collaborative construction of knowledge, reflection, articulation, coaching and scaffolding, and authentic assessment. Concerning the characteristics proposed by Herrington (2006), there is obvious alignment between authentic learning and heutatogy in which both of them emphasize the function of students' learning proses in education context as an endeavour to prepare the students to be capable in real-life context.

Furthermore, using Vygotsky's *Zone of Proximal Development (ZPD)* and its scaffolding concept as the underlying framework, Luckin (2008) introduced *Zone of Available Assistance (ZAA)* and *Zone of Proximal Adjustment (ZPA)* concepts in relation to clarifying the relationship between ZPD and educational technology. Scaffolding concept in ZPD context is defined as assistance given to learners or students by a more able partner or teacher as the central assistant who provides more challenging activities. However, in today's context where educational technology, including ICALL, has significantly flourished, this assistance role has expanded beyond teachers. The ZAA concept describes any resources, both human and artifact which are available within a particular context to help as a more able partner to give appropriate assistance to the less able learner. ZPA, in addition, is identified as the most appropriate subset of ZAA resources to use in the assistance. Furthermore, having ZPD, ZAA, and ZPA as the underpinning framework, Luckin (2008) considered "a learning context as an Ecology of Resources: a set of inter-related resource elements, including people and objects, the interactions between which provide a particular context" (p. 451).

Heutagogical-based ICALL environment framework

In relation to rich-technology learning environment where one promising advantage of the ICALL is its wide access for students to get information and learn from real-life context, ICALL has critical function as scaffold in the ecology of resources which is centred to learners. The interconnection framework between heutagogy, authentic learning, learner-centric ecology of resources, and ICALL has potential to the bring learning wisdom which would foster the lifelong learning. Figure 1 below shows how this interconnection would potentially develop students' capability.
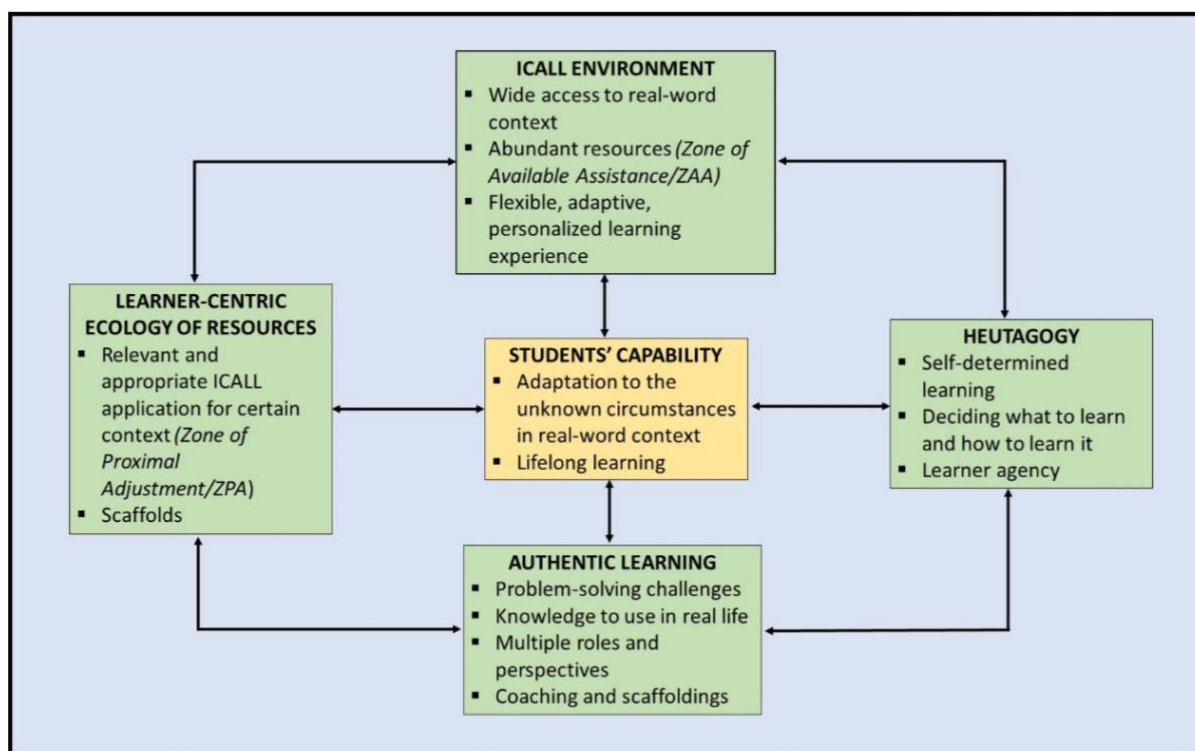
Figure 1: Heutagogical-based ICALL environment framework

Recommendations and next steps

Despite its promising potential, the research regarding heutatogy approach in practical implementation in EFL context is insufficient. In their research, Agonács and Matos (2019) highlighted some key findings related to published studies on heutagogy: the insufficient research on capability development and non-linearity dimension of heutagogy, the need of more longitudinal studies and quantitative statistical data to provide more empirical evidence, the limitation of geographic and cultural distribution of researchers as well as the population and sample size which mostly focus on adult learner population in formal educational context. In addition, Yang and Kyun (2022) also believe that the research that examined the practical role of teachers' intervention and configuration in ICALL context is scarce. In addition, Cochrane's et al. (2022) study about the design for transformative mobile learning using the pedagogy-andragogy-heutagogy continuum revealed that there is still a great need to investigate how to design mobile learning contexts that develop students' epistemic understanding and reinitiation upon heutagogy. Cochrane et al. (2022) argue,

> …it is clear that whilst all studies have a learner (pedagogy) focus (with this node being highest across cases), the specifics of how this pedagogy is delivered is still embryonic in many cases, with the cognition dimension of the DTML-PAH Matrix scoring the lowest, with none of the case studies reporting a focus upon the development of student epistemic understanding. Similarly, a focus upon creativity as reinitiation and a pedagogical focus upon heutagogy were only reported in one of the case studies (casestudy 2). (p.16)

Concerning those findings, it is crucial to do further research to fill out the existing gap in the literature and practice. Using the McKenney and Reeves's (2018) framework of educational-based design, designing an intervention of instructional design in ICALL environment would significantly contribute to the theoretical understanding as well as practical insight of heutagogic approach application in ICALL environment. Research for intervention that aims to generate knowledge about the characteristics of effective heutagogical-based ICALL that develops the students' capabilities should be conducted as an initial step of a long-term approaches of multiple iteration of design.

Conclusions

This concise paper proposes a framework for the design of ICALL learning environment to develop EFL students' capability based on the principles of the pedagogy-andragogy-heutagogy continuum, the learner-centric ecology of resources and the authentic learning framework.

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