

Developing Computer Engineering and Information Technology Undergraduates' Learner Autonomy: Individualised Instruction in English Classroom

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Abstract. The rapid development of information science and technology encourages lifelong learning and requires university graduates to be able to learn throughout their lives and have special abilities which help them search for continuous education and training opportunities. For students who associate their professional lives with computer sciences, learner autonomy is of immense importance since it helps them take full responsibility for success in professional life and career and contributes to the sustainable development of the current fast-moving digital society. As autonomous learners Computer Engineering and Information Technology undergraduates are able to define their goals clearly, to identify the most optimal learning strategies for achieving these goals and for acquiring new knowledge and skills necessary for their further professional development. The present study is aimed at finding out Computer Engineering and Information Technology undergraduates' viewpoints on effectiveness of individualised instruction for developing their learner autonomy in English classroom. With this in mind, the team of researchers applied a questionnaire to a sample of Computer Engineering and Information Technology undergraduates who study at three higher education institutions of Ukraine. Data collection lasted for three months and took place in September-December 2022. The obtained results clearly demonstrate that individualised instruction delivered through online teaching tools and apps in English classroom enables university teachers to develop Computer Engineering and Information Technology Undergraduates' learner autonomy effectively.

Keywords: *Computer Engineering and Information Technology undergraduates, English classroom, higher education institutions, learner autonomy, individualized learning.*

I. INTRODUCTION

The rapid development of information science and technology encourages lifelong learning and requires university graduates to be able to learn throughout their lives and have special abilities which help them search for continuous education and training opportunities. To be competitive in the labour market, to keep expanding their knowledge and learning new skills, the English language proficiency seems to be of significant advantage in the present-day globalised society [1] – [5]. Literature review shows that learner autonomy is believed to be important in mastering English among students of different ages and, moreover, of different specialties and, in this regard, Computer Engineering and Information Technology undergraduates are not an exception. Many scientists consider English as one of the most important 21st century skills for highly qualified professionals who work in the field of Computer Science or Information Technology and for whom English is not their native language [1] – [4]. K. Rajprasit & S. Hemchua indicate that “English language proficiency is vital for global computer engineers, from participating in the international professional arena and reaching a desirable position in terms of a career path, for

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example, job recruitment, routine work, promotion and advancement" [1, p. 109-110]. But it should also be noted that English as a discipline taught to Computer Engineering and Information Technology undergraduates is considered to be an effective medium for developing various job skills of tomorrow [5].

However, despite the obvious importance of learner autonomy, R. Smith opines that there are some restrictions in its developing among students [6]. The researcher explains that it happens because entering the higher education institution, it is the institution itself or the university lecturer who determines the discipline's objective and contents, designs a syllabus for a course, chooses methods and techniques used in the classroom, pace of learning, evaluates educational achievements of students etc. [6]. But, nevertheless, students who want to succeed in life, understand the value of knowledge in the present-day globalised world and, what is more, recognize the value of keeping knowledge, have to learn to gain new experience and acquire new knowledge independently and to be able to do it through formal, non-formal and informal education [7]. It means that to stay on the top of the learning curve, students should be able to manage their own learning, learn to regulate their own learning process and be able to recognise the ongoing need to acquire new knowledge, skills and attitudes through identifying own learning strategies effective for achieving learning objectives. And, in this connection, developing learner autonomy is an essential requirement as it enables students of different specialties (including Computer Engineering and Information Technology undergraduates) to meet their learning challenges successfully and helps them reach their full potential.

Thus, for students who associate their professional lives with computer sciences, learner autonomy is of immense importance since it helps them take full responsibility for success in professional life and career and contributes to the sustainable development of the current fast-moving digital society. As autonomous learners, Computer Engineering and Information Technology undergraduates are able to define their goals clearly, to identify the most optimal learning strategies for achieving these goals and for acquiring new knowledge and skills necessary for their further professional development throughout their lives. We do believe that the present-day English classroom is an effective place for developing Computer Engineering and Information Technology undergraduates' learner autonomy through teaching students a lifelong love of learning and motivating them to acquire knowledge throughout their lives. What is more, the working arsenal of present-day English teachers contains a wide option of traditional and innovative online teaching and learning tools which enable them to successfully individualise instruction.

II. LITERATURE REVIEW

A. *The Concept of "Learner Autonomy" in Scientific Literature*

Literature analysis shows that the concept of "learner autonomy" which has been in scientific circulation for more than forty years has various definitions. One of the most cited definitions was introduced by Henry Holec who defined learner autonomy as "... the ability to take charge of one's own learning" [8, p. 3].

An interesting point of view is expressed by B. Ivanovska [9]. Considering autonomy as a multidimensional phenomenon (i.e., social, individual and cultural dimensions), the researcher argues that learner autonomy has to be interpreted as "a complex process in the frame of a cultural and in globalized context, too" [9, p. 355].

In the paper "Self-Efficacy, Autonomy and the Relationships Towards to English Achievement" S. Xiao points out that being conceptualised as a universal human need, autonomy plays an important role in adolescent development [4]. Investigating the connection between self-efficacy and autonomy in achieving success in learning the English language, the scientist claims that learner autonomy and self-efficacy are inextricably linked. Moreover, self-efficacy is considered to be "an influential variable on learner's autonomy" [4, p. 306].

Á. Scharle & A. Szabó define autonomy as "the freedom and ability to manage one's own affairs, which entails the right to make decisions as well" [10, p. 4]. The researchers are convinced that to foster learner autonomy it is not enough to develop a sense of responsibility among students. To become autonomous learners, students have to be actively involved in making decisions that concern their learning. Moreover, Á. Scharle & A. Szabó believe that students can turn into responsible and autonomous learners only on condition of realising and accepting the fact that they share the same responsibility for learning in general and learning outcomes in particular as their teachers [10].

K. Millsom defines learner autonomy as a "students' ability to learn by themselves, to take it upon themselves to develop their understanding without relying on the teacher, either for motivation or for easy answers" [11]. K. Millsom also believes that learner autonomy can be developed by means of introducing various individual and group activities [11].

Analysing scientific literature on autonomous learning, L. Xu comes to the conclusion that after its introduction into the scientific circulation, the concept of "learner autonomy" is still debated by researchers [12]. The scholar identifies three different approaches to defining the concept of "learner autonomy", namely: ... "a personal characteristic, a political concept and a definition of educational practices" [12, p. 436]. In our research we accept the idea expressed by L. Xu that "... developing learner autonomy is a complicated project, which necessitates good coordination of various factors in the course of teaching and learning, such as changing ideas

about teachers' role and learners' role, redefining teachers' role in autonomous learning context, taking into account learners' individual differences in character, interests, needs, motivation, intelligence and use of learning strategies etc." [12, p. 435].

Considering autonomy as "a step-by-step process which consists of several phases, stages or levels" [13, p. 133], B. Horvathova claims that the core of the learner autonomy is manifested in the learner's "ability to make informed decision and choices ..." [13, p. 133].

Taking into account the analysed approaches to defining the concept of "learner autonomy", we define learner autonomy as a person's ability and readiness to be open to new opportunities, challenges and experiences throughout life with the purpose of personal and professional fulfillment. It means that to be autonomous, a person has to be able and ready (1) to take the initiative and the full responsibility for personal and professional development including acquiring and mastering knowledge and skills throughout life; (2) to adequately evaluate the level of knowledge and skills necessary for solving personal and/or professional tasks; (3) to reflect upon knowledge and skills gained through formal, non-formal and informal education; (4) to identify existing gaps in knowledge and skills necessary for solving personal and/or professional tasks and to fill them successfully; (5) to identify learning strategies effective for acquiring and/or mastering knowledge and skills necessary for solving personal and/or professional tasks; (6) to consider individual characteristics, interests and needs to develop himself/herself to his/her full potential; (7) to consider challenges as opportunities for personal and professional development.

B. Individualised Instruction

The analysis of the relevant literature demonstrates that in order to meet interests, needs and preferences of students of different ages and to turn them into active and responsible lifelong learners, teachers should enhance their teaching with individualized instruction [14] – [18]. It means that the choice of approaches, methods and techniques teachers use both in and outside the classroom should address the real needs of students and should be geared towards their equipping with a wide range of competences and skills.

Trying to find out what individualised instruction is, R. L. Collins emphasises his attention on two ideas that are the basis for understanding this concept [16]. Thus, according to the first idea, individualised instruction should be based on students' learning styles. The second idea is that instruction should be individualised considering gaps in each student's knowledge.

Reflecting on the similarities and differences between differentiated and individualised instruction, K.-T. Lindnera & S. Schwab come to the conclusion that both of them have a great didactic potential in meeting students' individual needs. But, at the same time, the researchers admit that individualised instruction "respects individual

needs of students more on a micro level and is paced to the educational needs of individual students" [17, p. 3].

Considering learning as "a stable and persistent change in what a person knows and can do" [18, p. 1], A. Shemshack and J. M. Spector suggest that "individualized instruction is one of the terms that are often used to talk about the specific needs and goals of individuals to be addressed during instruction" [18 p. 5].

Individualised instruction is also defined as a learning process "where students' personal needs are placed at the forefront of an instructor's teaching practices" [19].

In our research we define individualised instruction as instruction that promotes either gaining or mastering students' theoretical knowledge and practical skills (including filling the gaps in their knowledge or skills) on the basis of their individual and psychological peculiarities, needs or interests.

III. MATERIALS AND METHODS

The present study is aimed at finding out Computer Engineering and Information Technology undergraduates' viewpoints on effectiveness of individualised instruction for developing their learner autonomy in English classroom.

The research was focused on Computer Engineering and Information Technology undergraduates and was carried out at three higher education institutions of Ukraine (namely, Kyiv National University of Technologies and Design, Interregional Academy of Personnel Management and Kryvyi Rih National University). The research sample consisted of 177 Computer Engineering and Information Technology undergraduates (82 respondents – first year students (46.3%), 29 – second year students (16.4%), 37 – third year students (20.9%), 29 – fourth year students (16.4%)). It should be also mentioned that the research sample included 153 male students (86.4%) and 24 female students (13.6%).

To reach the aim of the study, the researchers developed a web-based questionnaire using Google Forms based on the analysed approaches to defining the concept of "learner autonomy" and the concept of individualised instruction". To find out respondents' viewpoints on effectiveness of individualised instruction for developing their learner autonomy in English classroom, the web-based questionnaire contained 4 statements for rating on a 4-Likert scale (from 1, strongly disagree, to 4, strongly agree), 1 close-ended question and 2 open-ended questions. Respondents were also asked to substantiate their views on statements offered for rating. Data collection lasted for three months and took place in September-December 2022.

The close-ended question was worded as follows:

Can you call yourself an autonomous learner?

The open-ended questions were worded as follows:

What is autonomous learning?

What activities do you consider effective for developing your learner autonomy in English classroom?

The respondents were asked to rate the following twelve statements:

1. *To develop learner autonomy university teachers have to consider students' interests and needs in the learning process.*

2. *To develop learner autonomy university teachers have to consider students' initial knowledge in the learning process.*

3. *To develop learner autonomy university teachers have to consider students' individual characteristics (including predominant perception channels, namely, visual, auditory and kinesthetic) in the learning process.*

4. *University teachers have to use a wide range of online teaching tools and apps to motivate students to gain knowledge independently.*

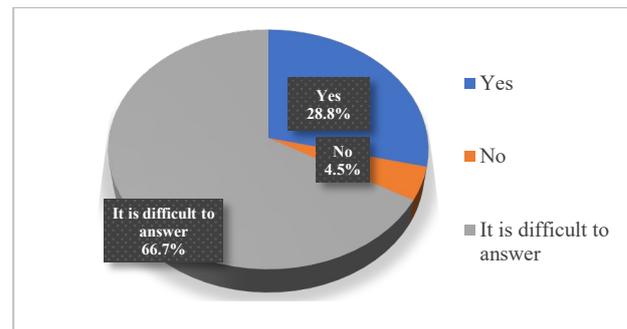
The research design was mixed and included qualitative and quantitative processing of the data obtained.

IV. RESULTS

The first question of our web-based questionnaire was “*What is autonomous learning?*?”. Replying to it, 29 respondents (16.4%) stated that they found it difficult to explain what it was. 148 respondents gave various explanations of what they considered autonomous learning was. The majority respondents (44.6%) understood autonomous learning as a self-directed way of gaining new knowledge and skills or mastering them. Here are some excerpts from their replies: “... *when students know exactly what learning outcomes they are expected to learn in a course and are given freedom to gain necessary knowledge and skills ...*” (Respondent No. 2); “*In my opinion, autonomous learning is when students are able to gain knowledge without teachers' help ...*” (Respondent No 5). Some respondents (21.5%) believed that autonomous learning is a way of managing own time while doing a task: “... *autonomous learning is when you are assigned a task (an individual project, working on presentation etc.) and given a deadline and you manage your own time to complete it. I mean when you know when the deadline is you can start doing something immediately or you, for instance, can postpone doing it to the last moment. You are the one who decides what to do. The more important is the result, I think....*” (Respondents No. 23). Some respondents (10.7%) pointed out that autonomous learning is students' ability to self-monitor the knowledge gained during the course: “... *how to self-monitor knowledge and understand where there is a gap...*” (Respondent No. 147). And for some respondents (6.8%) autonomous learning is a way of identifying learning strategies effective for acquiring and/or mastering knowledge and skills. Here is one of the most detailed excerpts: “*I think autonomous learning is when knowing your strengths and weaknesses (I mean some theoretical knowledge or practical skills you have) you try to find your own way of improving your weaknesses and do not forget to exercise your strengths...*” (Respondent No. 93). The results obtained show that although respondents

understand to some extent what autonomous learning is, no one relates it to the person's ability and readiness to gain knowledge and skills necessary for personal and professional fulfillment throughout life.

The second question was aimed at finding out whether the respondents consider themselves autonomous learners. The results obtained clearly indicate that only 28.8% of respondents considered themselves autonomous learners, 66.7% of respondents found it difficult to answer this question and 4.5% of respondents replied negatively answering this question. Figure 1 provides a visual display of parents' opinions on signs of anxiety among their children of different school ages.



Source: own study

Fig. 1. Respondents' views on whether they consider themselves autonomous learners.

Table 1 shows the data concerning respondents' views on effectiveness of individualised instruction for developing their learner autonomy in English classroom.

TABLE 1 RESPONDENTS' VIEWS ON IMPORTANCE OF THREE TRANSFORMATIVE COMPETENCIES

Statements	Strongly disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
To develop learner autonomy university teachers have to consider students' interests and needs in the learning process	0.0	0.0	51.9	48.1
To develop learner autonomy university teachers have to consider students' initial knowledge in the learning process	0.0	0.0	42.9	57.1
To develop learner autonomy university teachers have to consider students' individual characteristics (including predominant perception channels, namely, visual, auditory and kinesthetic) in the learning process	0.0	0.0	35.6	64.4
University teachers have to use a wide range of online teaching tools and apps to motivate students to gain knowledge independently	0.0	0.0	24.3	75.7

Source: own study (N=177)

The results in Table 1 clearly demonstrate that the 51.9% of respondents agree and 48.1% of respondents strongly agree with the fact that to develop learner autonomy university teachers have to consider students' interests and needs in the learning process. Substantiating their views on the first statement, the respondents explain that when university teachers consider their interests, support and encourage their development, they feel motivated and do not want to stop on the achieved results. Considering students' interests and needs in educational process also helps to build trust and a good rapport between students and teachers which enables them to more effectively communicate in the classroom. 42.9% of respondents agree and 57.1% of respondents strongly agree that to develop learner autonomy university teachers have to consider students' initial knowledge in the learning process. Explaining their point of view on the second statement, the respondents explain that it is desirable to take into account their initial knowledge in the learning process. They also mention that if you are not used to learn independently and you find it hard to reflect on knowledge you lack or, what is more believable, you are not ready to make some efforts to fill in these gaps independently, teachers' assistance is of great importance. You are not fully capable of assimilating more complex material if you lack some basic knowledge, on the one side, and, on the other side, some gaps in knowledge which are not filled in cause more serious problems connected with your confidence. That is why, when teachers know that university students' have some gaps in knowledge, they can help fill in these gaps providing some learning materials for self-studying and/or involving them in some activities aimed at gaining this knowledge independently. 35.6% of respondents agree and 64.4% of respondents strongly agree that to develop learner autonomy university teachers have to consider students' individual characteristics (including predominant perception channels, namely, visual, auditory and kinesthetic) in the learning process. The analysis of the respondents' responses on this statement shows that they do believe that considering their individual characteristics in the learning process is important. The respondents point out that nowadays university teachers present learning material in various ways (i.e., presentations, video-lessons, pre-class homework etc.) which enables to influence all perception channels. Moreover, activities which are often used in the English language classroom are aimed at developing four language skills (i.e., reading skills, listening skills, writing skills and speaking skills) and involve all channels of perception of information. And 24.3% of respondents agree and 75.7% of respondents strongly agree that to motivate students to gain knowledge independently university teachers have to use a wide range of online teaching tools and apps. Justifying their perspectives, the respondents state that various online resources with up-to-date information, online platforms and applications with interactive activities can stimulate at once several perception channels and their use in the English language

classroom enables teachers to keep students motivated. What is more, they believe that multiple performing some interactive activities inspires them to gain knowledge independently and encourages them to continue practicing. In their replies the respondents list various online platforms and applications used during their English classes, namely, Learn English Online by British Council (<https://learnenglish.britishcouncil.org/>), Breaking News English (<https://breakingnewsenglish.com/>), BBC Learning English (<https://www.bbc.co.uk/learningenglish>), Daily Grammar (<https://www.dailygrammar.com/index.html>), Ted (<https://www.ted.com/>), Kahoot, Online Board Miro, Google Classroom etc.

To identify activities considered effective for developing learner autonomy in English classroom, the researchers use the content analysis method. Table 2 demonstrates the obtained results.

TABLE 2 RESPONDENTS' VIEWS ON ACTIVITIES EFFECTIVE FOR DEVELOPING LEARNER AUTONOMY IN ENGLISH CLASSROOM

Categories	Number (N)	Percentage (%)
Individual tasks according to students' individual characteristics (including predominant perception channels, namely, visual, auditory and kinesthetic), interests and needs	134	75.7
Pair work	41	40.1
Small group work	68	38.4
Work in big groups or teams	56	31.6
Activities based on the use of online tools	159	89.8

Source: own study (N=177)

The results in the Table 2 show that the majority of respondents (40.1%) believed that the most effective activities used in the English language classroom were connected with doing individual tasks according to their either individual characteristics (including predominant perception channels, namely, visual, auditory and kinesthetic) or their interests and needs. 40.1% of respondents pointed out that working in pairs while learning English promotes effective development of learner autonomy. Small group work was considered to be effective in developing learner autonomy by 38.4% of respondents and work in big groups or teams by 31.6% of respondents. What is also interesting is that 89.8% of respondents point out that activities based on the use of online tools in the English language classroom are effective in developing learner autonomy.

V. CONCLUSIONS

The present study is aimed at finding out Computer Engineering and Information Technology undergraduates' viewpoints on effectiveness of individualised instruction for developing their learner autonomy in English classroom. The obtained results clearly demonstrate that

individualised instruction delivered through online teaching tools and apps in English classroom enables university teachers to develop Computer Engineering and Information Technology Undergraduates' learner autonomy effectively. At a much broader level, the ideas arisen during our research can be generalised and represented as two teaching strategies to be implied as a result of investigating both individual and psychological peculiarities of students and their corresponding activities used in the English language classroom aimed at developing learner autonomy as a particular issue and on the way of mastering English as a more general issue. Thus, we can assume that investigating individual and psychological peculiarities of students which can directly or indirectly influence the achieving of best learning outcomes is the background for realisation of didactic potential of the English language classroom. That implies the implementation of two teaching strategies aimed at developing students' learner autonomy, on the one side, and, on the other side, mastering the English language as a whole. The first teaching strategy presupposes the utmost use of predominant perception channels (i.e., visual, auditory and kinesthetic) for accumulating specific subject- and language-content. The second teaching strategy presupposes the use of rationally-balanced combinations of tasks and assignments actively used in the process of learning English as ones that could compensate and enhance the less developed perception channels while accumulating specific subject- and language-content.

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