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The Ecological Framework of ICT Used in Teaching and Learning: A Case Study in Kazakhstan

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ABSTRACT

Improving educational and learning experiences requires the incorporation of technology for communication and information (ICT) into language instruction. However, there is a gap regarding how language instructors in higher education, particularly in Kazakhstan, engage with ICT in their teaching practices. This study explores the reasons for ICT adoption among language instructors in the Kazakhstani higher education system, offering insights into their experiences and attitudes towards technology integration. The mixed-methods approach used in the study combines quantitative data from a questionnaire survey with qualitative insights from in-depth interviews. It constructs an ecological framework of ICT adoption by combining descriptive, exploratory, and explanatory research approaches. The model offers a grounded explanation of the factors influencing ICT usage, derived from both top-down institutional pressures and bottom-up individual attitudes. The results of the study reveal that language lecturers primarily use ICT for routine tasks, such as organizing classes and preparing instructional materials. The study highlights how crucial it is to take instructors' collective viewpoints into account when deciding on tactics that encourage or discourage the use of information and communication technologies. The study expands to the wealth of knowledge on ICT use by instructors of foreign languages in Kazakhstan's university system and highlights the significance of considering lecturers' perspectives collectively when making decisions about ICT use policies.

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1. Introduction

The integration of advanced technologies like cell-phones, smart boards, and online platforms has transformed learning settings, thereby increasing the need for digital tools to enhance teaching and learning processes^[1]. Due to their limited exposure to the target language, students, especially those learning English as a foreign language (EFL) situations, need enhanced technological support to aid in their language acquisition^[2]. Studies show that educators generally endorse the use of Information and Communication Technologies (ICT) in language instruction due to its potential positive impact on student learning^[1]. However, the effective implementation of these technologies in educational contexts remains inconsistent, raising questions about the factors that influence their adoption.

To better understand the complexities of integrating ICT (Information and Communication Technology) in language instruction, this study uses an ecological framework developed by^[3]. This framework offers a comprehensive way to explore how individual, institutional, and societal factors interact to shape the adoption of ICT. The impact of various influences—such as policy, culture, and infrastructure—on the use of educational technology is crucial, as explained by Verschueren's ecological model^[4]. However, even though these factors are widely acknowledged as important, there has been a significant lack of focus on the role of higher education in Central Asia, especially in post-Soviet contexts like Kazakhstan.

This research aims to fill this gap by investigating how language instructors at a Kazakhstani university navigate the challenges and opportunities associated with ICT integration. Specifically, it seeks to uncover the factors that shape the adoption of ICT in this unique educational setting. By utilizing a mixed-methods approach, the study examines the ways in which language instructors utilize digital tools, while also addressing the broader implica-

tions of their experiences on language teaching practices.

The research problem centers on the limited use of ICT in language teaching within Kazakhstan and other post-Soviet countries. It explores the multifaceted factors that influence lecturers' decisions to adopt or avoid ICT, investigating the intricate interplay between institutional, personal, and environmental elements. By shedding light on these dynamics, the study aims to provide valuable insights that can inform strategies for improving teaching and learning through enhanced technology integration. Ultimately, this research underscores the significance of understanding the contextual factors that affect ICT use, which is essential for fostering a more effective and supportive educational environment in Kazakhstan and similar contexts.

1.1. Literature Review

Ever since first introduced into education ICT take up has been problematic^[5,6,7,8]. Some lecturers successfully incorporate ICT into their classroom instruction, while others struggle with creative use or completely avoid it. This has been explained in terms of factors of ICT encouragement and discouragement at both teacher and institutional level^[9,10,11,12].

At the teacher level, confidence, competence, and general attitudes influence the extent of ICT use. For example, research has shown that pedagogical orientation can be more influential than technical skills and some researchers have seen a relationship between beliefs in student-centred learning^[13,14,15], as well as one between individual lecturers' creativity and willingness to collaborate^[16,17], and their ICT use. Fear of failure (or embarrassment at lack of ICT knowledge) can lead to lack of confidence^[11,18,19]. Meanwhile, it has been discovered that class size and teaching experience are statistically related to students' use of technology^[20]. Furthermore, there is a lengthy history of examining the significance of user and usefulness perceptions, when deciding to use digital tools^[21,22].

Institutional factors affecting take-up include level of technical support ^[23,24,25,26] and provision of computers; extent and quality of training ^[27]; and workloads alongside curriculum constraints ^[28,29]. Beyond the university, policy restrictions and the misappropriation of public funds are obstacles to adoption ^[30,31,32]. Lecturers can be constrained due to tensions between stakeholders including policy makers, lecturers and students and encouraged to use ICT when these tensions are addressed ^[33].

Recent advances in AI tools have the potential to transform the educational landscape by providing personalized learning experiences and facilitating assessment. For example, AI-driven platforms analyze the learning patterns of students and give them personalized feedback, thus more engagement and better retention of the students can be achieved ^[34]. Furthermore, AI language learning tools, along with virtual assistants, would let the students practice outside the class, while simultaneously giving insights to instructors on student performances. However, all these technologies would work out effectively only with proper institutional support, appropriate training, and openness to change teaching methods to exploit the at will innovations ^[35,36].

The use of AI tools in EFL instruction has been the subject of more recent studies, which have shown how these tools affect students' involvement and academic performance. Wu et al. conducted a mixed-methods study that examined factors affecting EFL college students' intentions to use AI in distributed learning environments and established that personal and situational factors significantly affect user engagement ^[37]. Similarly, Huang, Wang, and Zhang explored generative AI acceptance among EFL learners, emphasizing the roles of teacher enthusiasm and self-efficacy in enhancing students' well-being in the digital age ^[38]. Wang and Wang approached the topic from a self-determination theory perspective, uncovering how Chinese EFL learners engage with large language models, which fosters a sense of autonomy and competence ^[39]. Moreover, Wang and Xue demonstrated that AI-driven chatbots could effectively enhance academic engagement among Chinese EFL students, indicating a promising avenue for intervention strategies in language learning ^[40]. Collectively, these studies underscore the potential of AI

tools to transform EFL education by promoting active participation and improving overall learner experience.

The research has given us a helpful pragmatic picture of opportunities and constraints on ICT use and a number of influential theoretical frameworks have been produced to help develop our understanding further, including Technology Acceptance Models or TAM ^[41,42]. However, a criticism of past research is that it has tended to focus on lecturers ('Who are they?', 'What have they used?') and much less on what lecturers are expected to do in the context in which they work. But context is important as lecturers with the best of intentions will be thwarted in their use of technology if tools are scarce. In contrast, reluctant lecturers may find themselves using digital tools if surrounded by a culture in which there is high support for innovation and strong expectations around ICT use ^[26].

There are, however, different ways of understanding the ways that this wider context exerts an influence on the individual. For example, Tomte et al. shows it not sufficient to rely on policy makers and individual enthusiasts when trying to promote ICT, something more joined up is needed ^[43]. More theoretically, researchers have drawn on field theory ^[44,45,46] and activity theory to understand the forces acting on an individual teacher ^[47,48,49]. However, in this paper, we are drawn towards an explicitly ecological framing of ICT take-up as offering a more flexible approach.

Ecological theory is often traced back to Bronfenbrenner who introduced the idea that child development unfolded within five systems ^[3]: the micro (that which is immediately experienced); the meso and exo systems as systems which are one step removed from the individual; and, more distant still macro discourses and policies ^[50]. To give a time dimension Bronfenbrenner also wrote about chrono systems – drawing attention to how past experiences continue to influence systems. Ecological modelling has been transferred to many different contexts and occasionally found its way into discussion of technology, albeit not always with direct reference to Bronfenbrenner. For example, Davis saw decisions about the use of ICT as nested within school, district, state, national and global systems. This is illustrated in an 'arena framework' set in which lecturers and parents play a critical role ^[41]. Using an ecological analogy, they are described as the 'keystone species.'

Ecological models can be used to show tensions, and often gaps between different levels when it comes to organising the take-up of ICT. For example, Rana et al. showed a gap between policy implementation and the readiness of schools to use ICT in Nepal which NGOs tried bridge^[51]. According to Verschueren, technology is not ecologically appropriate for schools unless it fulfills a specific need^[3]. He also emphasized the significance of viewing the educational institution as a multi-layered environment.

These examples of ecological framing are useful, however most of the work has been applied in school rather than HE settings, and further some frameworks have been overly complex and difficult to transfer across the contexts in which they were first developed. With a case study of Kazakhstani higher education lecturers, this study aims to provide a readily available ecological model that explains how and why educators use ICT.

1.2. The Context of the Study

Kazakhstan presents an under-researched but interesting context for looking at the take-up of ICT. After gaining its independence in 1991 Kazakhstan sought to address some of the drawbacks of a soviet style system of education. Schools as well as higher education (HE) learning was largely based on memorization of facts and lecturers considered to be the main source of information and knowledge. According to Galushko, the Soviet legacies were mostly driven by political ideology, disengaged from international trends, inadequately funded, and tailored to the requirements of the soviet economy^[52].

In an effort to modernize, the government of Kazakhstan entered the Bologna process with an aim of joining the world education community. This was followed by membership of the European Higher Education Association. Large scale changes took place in Kazakhstan, including upgrading the curriculum, introducing a more robust system of accreditation, and a greater degree of autonomy for universities as set out in various position papers and programmes of development^[53]. Despite these efforts, Kazakhstan's tertiary sector has been marked by limited accessibility to funding and research facilities, and it is still undergoing transition^[54]. Research conducted by Bokayev

et al.; Mustafina ; Kerimbayev et al.,; and Kaskatayeva and revealed that ICT integration has not always had the impact that was hoped though much of this research has focused on schools rather than HE^[55,56,57,58]. In these studies factors such as policy decisions, access to technology, lecturers' attitudes to their subject and towards technology, knowledge and confidence with technology, gender and age were seen as affecting ICT use and all played a part.

The second aspect of context is that in this study we are looking at lecturers who teach foreign or second languages^[59]. ICT has certainly long been thought to have the ability to enhance language instruction and acquisition. This has been true over time. For example, the novelty effect of ICT use was mentioned first by Clarke; Buscaglia and Holmen saw the computer environment as stimulating communication activities^[60,61]; and Kopinska believed networking could help students understand the cultural context of a target language community^[62]. More recent research has pointed to the use of communication technology to enable students to access authentic target language material^[63,64] and to access target language speakers^[65]. Online platforms are seen more generally as breaking down time and distance barriers (and extending the reach of learning^[66] and there have been recent moves to bring robotics and AI into teaching^[67].

The context of the study is further interesting as language is a particularly important aspect of education in Kazakhstan as it is officially a trilingual country with Kazakh (the most widely spoken language), Russian (a first language for a large minority), and English (the language of the global economy) all widely spoken^[68]. For this reason, most universities in Kazakhstan offer three language streams of education and for all students Kazakh and Russian are mandatory subjects, while English is a required subject in the first and second year of study. This is the reason why this study has focused on lecturers of these three subjects.

There are over 20,000 undergraduates and more than 2,000 faculty members at the university. Despite its unique features, this public university has an extensive background and tradition, and the challenges it faces in advancing ICT are common to higher education in Kazakhstan. The English, Kazakh and Russian lecturers at the time of

the study provided language courses for students in other faculties, prepared student lecturers with specialisms in target languages, and taught general courses covering culture and literature. Their work covered first degree, masters and in some cases doctoral teaching, though lecturers tended to concentrate on one sphere of activity. As lecturers they were expected to research as well as teach though preparation, teaching and assessment limited the amount of time available for this. In some cases, lecturers worked part time, depending on their circumstances.

2. Methodology

The study was framed by a loosely worked ecological framework with a focus on how ICT was encouraged and discouraged at different levels with the aim of producing a grounded model to explain ICT use. The study was in part descriptive (i.e. describing what was happening), part exploratory (although the study began with a general interest in ecological models there was a strong bottom-up element to data analysis and theorisation), and part explanatory (a model was generated to provide an explanation of a phenomenon).

2.1. Data Collection and Analysis

The mixed-methods approach that includes quantitative surveys and qualitative interviews has been used to assess the usage of ICT and to identify influencing factors. Ethical approval for the research was obtained, and thematic coding was conducted on data. Findings from the study have generated useful insights into factors determining the adoption of ICT among lecturers, while underlining the importance of ethics in education.

By analyzing the degree to which language professors used ICT and the variables that supported or inhibited its usage, the study's main goal was to create an ecological framework of ICT adoption. Permission to carry out the study was given by the institution and normal ethical procedures (including consent, confidentiality, anonymity, respect for participants) were followed. It was a qualitative approach, complementing the quantitative data through interviews. Indeed, interviews shed light on valuable in-

formation concerning the industry, and thus participants targeted were based on their expertise in ICT. However, the data had to be interpreted precisely and also be coded reliably for analysis. This approach categorizes discussion findings into groups of similar meanings. Coding links data with some topics, concepts, and themes, and consistency in coding from one different person to another gives the reliability of the analysis.

2.2. Sampling Selection

The survey was thus distributed by email to enhance response rates, and follow-up messages were done through WhatsApp to explain the purpose and encourage further contributions from willing respondents. The study examined the reliability of several items including ICT training, ICT use, perceptions of ICT, and access to ICT outside the university. Cronbach's alpha is the measure of internal consistency for the items on the survey, and its theoretical logical range is from 0 to 1. Closer to zero, this reflects unreliable responses, whereas if it approaches 1, the responses have a high reliability factor. Generally speaking, 0.7 or above is considered an acceptable Cronbach's alpha ^[69]. In the current study, Cronbach's alpha averaged 0.71, which is considered as presenting acceptable reliability.

2.3. Survey

Altogether, 111 surveys were successfully completed with a response rate of 37% among the lecturer who teach the language course for English, Kazakh and Russian. A questionnaire was distributed to all lecturers of English, Kazakh and Russian (n=298) and 111 valid returns were collected (English lecturers n= 47; Russian n=36; Kazakh n=25, n=3 missing). Demographic information was gathered by the questionnaire, which included availability of ICT (7 items), gender, age, language expertise, and experience in teaching (4 items). Other sections addressed general knowledge of ICT (4 items); use of ICT (11 items), attitudes to ICT (8 items) as well as influences beyond the institution (3 items). Questionnaires were collected and data entered into SPSS. Data were presented descriptively using frequency tables generated within SPSS. In a second phase of analysis the Likert scale responses to ten items

concerning frequency of ICT use were coded: 1 (rarely), 2 (sometimes), 3 (often), 4 (always). Scores were then aggregated to give an overall indication of the extent of individual lecturers' ICT use.

3. Results

The results are organised around the extent of use and the encouragers / discouragers for use.

3.1. The Degree to Which Language Lecturers Use ICT

While the majority of lecturers had very limited access to an overhead projector, they were still able to find ways in which to use ICT in their instruction. These applied technology for the class presentations, recording audio and video, communicating with students outside of class time, and for storing resources. In doing this, their approach to teaching was greatly enhanced and their interaction with students significantly improved. It was this flexibility that allowed them to lead the creation of Active Learning Classrooms and to continue with their work in strengthening communication and collaboration, which is

in fact a function of the use of ICT in education, even in conditions of limited technological resources.

All the results were pointing in the same direction. It became evident from the questionnaires that the main uses of the Internet by lecturers are for preparation and accessing online resources for the lessons. They also responded to using ICT for communicating with the students after classes more regularly, as can be seen from **Table 1**. Interviews provided more detail on specific tasks: lecturers used ICT for showing the prepared material and also to vary the style of teaching. This included images and video clips that had been used and underutilized, besides integrating AI tools for teaching and assessment. Others have gone further to use the ICTs to inspire creativity through the scripting of videos, making e-books, and using Instagram. All along the way, they remain in close touch with the students using email and WhatsApp. Outside the classroom, lecturers curiously looked online for teaching resources and authentic learning materials, and often embedded these into their presentation slides. Overall, ICT helped lecturers remain in good contact with the students and make the learning experience better.

Table 1. Frequency with which ICT was used by respondents (data given in percentages of valid responses).

Statements	1 Never	2 Rarely	3 Some-times	4 Often	5 Always
I use the Intranet to send course information to students.	5	12	12	28	44
I use Internet to prepare my resources	2	10	23	44	21
I use Power Point or other presentation software in my lessons.	1	13	30	37	19
I use a mobile phone to contact students about lesson issues.	8	11	26	30	25
I send and receive students' work by email.	4	15	28	34	19
I encourage students' ICT use out of class (e.g. discussion forums, blogs, wikis)	4	16	33	25	25
I prepare lessons with the help of ICT	4	13	36	30	17
I recommend students to use online test and revision resources.	4	11	41	23	22
I use the CD-ROM that comes with the textbook in class.	17	17	28	19	18
I use IWB (Interactive White Board) in lessons.	26	23	27	15	9

3.2. Factors Influencing ICT Use among Language Lecturers

Encouragers and Discouragers

Key themes here covered beliefs about ICT and other personal characteristics; access to ICT; the wider environment.

Lecturers' attitudes toward ICT beliefs are consistent. According to study results, for example, the majority of lecturers tried incorporating more ICT into their lessons because they believed it encouraged students to learn and helped them become responsible members of society. Additionally, they believed that shared learning experiences

and participation in online seminars and conferences could be fostered via ICT. It's interesting to note that many professors felt that ICT had changed their roles and inspired them to be more enthusiastic about teaching and learning.

During the interviews, the lecturers revealed that ICT has had a beneficial impact on students' learning experiences and that the learning process was facilitated. Technology enhanced their teaching content which allowed them to get the most recent resources online. A few lecturers, particularly those in Kazakh, however, explored that the use of ICT might have partially filled gap as a result of shortage of hard copy resources. Overall, these professors considered ICT to have increased not only the organisation of how they deliver their lessons but also the effectiveness of their lessons.

Several interviewees expressed a strong desire to include technology into their teaching, with one Kazakh teacher providing an explanation:

"Technology over the last decade or so has profoundly changed our lives; it happened recently and it had a real effect on students' learning, their ability to teach. I've always had a passion for new technologies, so I was really excited when my husband got me my first computer. Classrooms are currently being entirely altered by computers, iPads, and AI tools thanks to interactive apps, personalized feedback, and enhanced instructor comprehension. With creative methods, they are revolutionizing education."

Nearly all of the instructors who participated in the study indicated that they owned personal laptops and had been connected to the Internet both in their professional and classroom environments. The majority of the respondents preferred email and mobile phones for communicating with their students. A few of them attributed the facilitation of technology integration to the presence of portable projectors in classrooms lacking fixed overhead displays and access to the Internet. The instructors explained that easier access to the Internet had facilitated incorporating ICT into their professional and private lives. These findings were further supported by observational data, with indications that during classroom sessions, both tutors and students utilized computers and mobile phones to look for information.

However, access was also a discourager or rather reduced access was. Survey data indicates that lecturers have limited access to computers and projectors in teaching rooms (see **Table 2**), and portable projectors are not utilized in observation lessons.

"The availability of ICT resources in our institution is relatively limited; hence we face a lot of difficulties. For example, to have a projector in every classroom would mean a big contribution toward the improvement of the quality of our teaching-learning process. Currently, we have two projectors at the disposal of forty lecturers. Every time we use one of them, we are responsible for its safe return and not damaged".

While computers provided to educators in their offices were occasionally referred to as outdated, devices such as laptops and smartphones used in the courses belonged to the lecturers and students.

Table 2. Percentage of respondents who responded 'yes' to items covering access to ICT.

Statements	Percentage 'yes'
I have a computer in my office.	89
I have access to computer support when I need it	70
It is difficult to book ICT equipment for language teaching*	53
In my teaching room I usually have a single computer.	52
All the teaching rooms have access to the Internet.	49

*reverse scored.

The interviews revealed that leaders' support was the primary source of encouragement for lecturers to use ICT. They felt motivated to use ICT due to training, Ministry of Education and Science (MoES) awards, and evaluation criteria. Most lecturers agreed that department supervisors supported their use of ICT. Some professors appreciated IT services' assistance, while others acknowledged the support from tech-savvy students who promoted using lectures. Overall, these external influences played a crucial role in motivating lecturers to use ICT effectively.

The academic environment was perceived by lecturers as being more accepting of innovation, and they were conscious of shifts in both political and social culture. They had read widely read articles regarding the future of ICT, so they had become aware of how technology was

used in society and how they used it on a daily basis.

The wider environment discouraged ICT integration, leading to gaps in resources and development courses. Lecturers felt leaders and the education ministry provided a “lip service” to technology, and many were not optimistic about plans. Although the policy was supportive, it was meaningless without the necessary resources.

One lecturer in Russian stated:

“While we have a policy encouraging the use of ICT, what we need is an implementable policy to that effect. What lecturers need, rather, is not just written encouragement; we need enabling resources that facilitate technology integration in the classroom. For example, if we are to use technology in our classrooms, then we must be assured of at least computers and projectors in each class”.

4. Discussion

The findings in the study were integrated into an ecological framework capturing lecturer characteristics, institutional arrangements, wider environment, discourses about technology and ICT policy as illustrated in **Figure 1**.

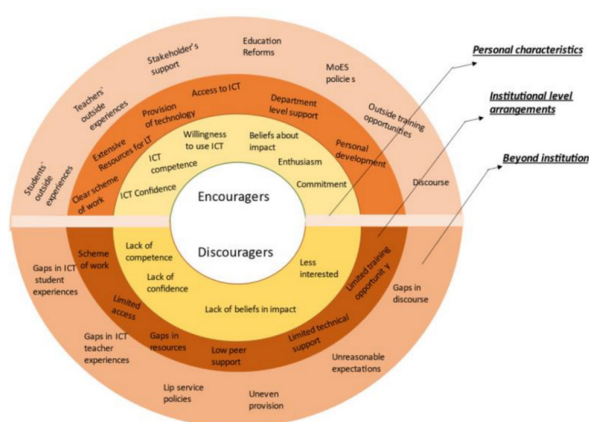


Figure 1. Ecological framing of lecturers’ perceptions of ICT use.

This ecological diagram (**Figure 1**) shows three layers: lecturers’ personal characteristics including their beliefs, attitudes and skills; institutional arrangements including provision, support, and access; and beyond the institution including policies and wider discourse about technology.

Each layer has opportunity and constraint. At a

personal level (or inner layer in the diagram) lecturers’ positive beliefs, attitudes and ICT competence serve as an encourager, but the lack of these serves as a discourager. It goes without saying that lecturers’ opinions are subject to change; they are shaped by their experiences both inside and outside of the classroom.

The second layer contains encouragers and discouragers reflected in the material and social world of the universities. Schemes of work, ICT guidance, training and support are considered as cultural components; teaching infrastructure such as computers in every classroom, high-speed internet and projectors are considered as physical components. Again, the system is dynamic. For example, lecturers with certain personal characteristics (positive, negative) may be present at the faculty meetings where technology planning is discussed and developed, and these discourses may have an impact to their work. In practice, ICT seemed much more likely to be used when there are schemes of work that signal or even mandate its use.

The third, the outer layer, goes beyond the institution and covers the resources for the university to provide ICT infrastructure. It also covers a wider discourse including the idea of modernisation contained within policy documents. Here it is important to provide resources that allow ICT use, rather than make general policy statements about its usefulness. Beyond the institution lecturers can also access resources from cultural institutes and news services.

A complaint made about the original burst of ecological studies inspired by Bronfenbrenner is that they focused too much on systems rather than individual agency, but in this study the beliefs and attitudes of the individual are important and result in markedly differentiated outcomes. Those who use ICT most frequently overcome as far as possible the constraints of the systems; they are driven by their beliefs on how technology affected instruction and learning, to some extent, they are prepared to ‘disrupt’ the traditional ways of teaching. Medium users notice a blend of encouragement and discouragement; and lower users see more discouragement than encouragement. In part the findings are resonant with at least some of the literature in that higher level users of ICT seemed interested in a more student-centred approach^[70] and felt

more confident of their skills ^[19]. There are studies in which female lecturers are more likely to use ICT than male but this is by no means a general finding and there is no consistent picture of the influence of age on use. The more important point in this study is that individual characteristics need to be seen in a wider context of teaching to a curriculum framework and stimulated by lecturers and students' everyday engagement with ICT ^[29,71]. Attitudes are not defined by personal characteristics, they can and do change.

The ecology model shows that sustainable use of ICT is consequence of both activity and structures. It suggests that top down changes are valuable, but these need to be made fit for purpose through lecturers working together on departmental documents and policies. Layers are interrelated and each affects the others, so that bottom up changes will fall short without adjustments to schemes of work and assessment and top down change will not succeed without addressing concerns over resources and training. If the different layers or systems do not line up then outcomes are inevitably patchy ^[41,43,51] something also seen in more recent reflections on the switch to remote learning during the lockdown associated with COVID-19 pandemic ^[55]. Mandated changes can then prove effective in pushing institutions and individual lecturers and lecturers to take-up ICT but gaps in resource, training and support will reduce the effectiveness of what is being offered.

Earlier, a complaint was made the ecological system models can be too complex to be transferable but here the key issues in this study have been abstracted out, and an accessible vocabulary introduced. The aim of the model is to assist researchers in other contexts. However, this is a model produced in the particular context of lecturers in Kazakhstan and needs to be adapted to circumstance. Similar influences may be found in other systems but the exact unfolding of ICT use will have its own characteristics. One important consideration here is the cross over between higher education and school sectors. There is a surprising degree of commonality in terms of explanations given for ICT take-up in these two sectors, though it is important to bear in mind that schools are more directly influenced by policy makers and this may lead to a greater focus on

training of lecturers and provision of ICT. At least, this appeared the case in Kazakhstan.

The research points to the importance of embedding ICT in pedagogical practice for language teaching. It indicates that personal beliefs, institutional support, and social context are crucial in modifying teaching practices. Positive beliefs about adopting ICT are necessary for successful implementation, and educational institutions should focus on professional development programs to enhance technical capabilities and reflect on how ICT can help bring a revolutionary change in teaching and learning. Institutions should provide clear guidelines and expectations for ICT use, develop specific schemes of work, and hold faculty meetings to discuss technology planning. On a broader societal level, policies should allocate resources for ICT infrastructure development and address the training needs of educators. Institutions should also create an inclusive environment where all lecturers feel empowered to use technology. In summary, developing an innovative culture of collaboration and continuous professional growth will make a great contribution to the effective use of ICT in language education.

The limitations of this research encompass its concentration on higher education in Kazakhstan, the possibility of biases stemming from self-reported data, the intricate nature of the ecological model, and its neglect of the dynamic evolution of technology and its influence on pedagogical practices.

Further research on ICT use in Kazakhstan may be conducted around policy changes, infrastructure development, digital literacy, cultural and contextual issues, AI, comparative studies, student-centered learning, and longitudinal studies. All these themes will contribute to understanding how integration influenced teaching practices, students' engagement, and learning outcomes. The study could also investigate how the availability of ICT infrastructure is related to the quality of education, evaluation of digital literacy programs, and analyze what possibilities artificial intelligence holds within instructional and learning frameworks. Comparisons with other Central Asian states could be quite useful in gaining insight into effective methodologies. Longitudinal research could track the long-term effects of ICT implementation on student

performance and teaching practices.

5. Conclusion

This paper has explored the ICT adoption by three language lecturers in Kazakhstani higher education institutions. Results have shown striking variation in how these lecturers use ICT, shaped by their own beliefs about technology and the particular institutional environments in which they work. It emerged that a decision to implement ICT in their teaching must entail an overt weighing of affordances and limitations within one's surroundings.

The current study developed an ecological model that captured complex dynamics affecting the usage of ICTs in higher education. This model served to provide insights not only into those things that encouraged or discouraged the integration of ICT, but it could be a useful framework for future studies in a variety of educational contexts. By illustrating this interplay between personal attitudes, institutional support, and wider policy frameworks, the model provides a holistic perspective that might help enrich our understanding of ICT adoption in different contexts.

The pedagogical implication from this research is huge. There is a need for educators to understand that beliefs and attitudes toward technology are important factors in making changes to improve ICT usage in language teaching. Besides that, the institutional framework should pay greater attention to support systems through training and resources to help lecturers feel more confident in using ICT within the curriculum. These may promote cooperation and the development of a creative culture among learners and language instructors.

This paper emphasizes the significance of studying the reasons behind the adoption of Information and Communication Technology (ICT) in language instruction, with a particular emphasis on Artificial Intelligence (AI) tools. It argues that the use of ICT in various sectors, including higher education, is crucial and claims that these tools improve language teaching and evaluation processes.

The article discusses the persistent difficulties in promoting the use of technology in education and stresses the importance of a comprehensive approach that includes

support at every stage of the educational process. By tackling these challenges and fostering an environment conducive to ICT adoption, educational institutions can enhance teaching methods and better prepare students for a technology-driven world.

Author Contributions

Conceptualization, A.N.; methodology, A. Yildiztas; software, M.T.; validation, A.O.; formal analysis, A.N.; investigation, A.N.; resources, A.N.; data curation, A.N.; writing—original draft preparation, A.N.; review and editing, G.Y.; visualization, A.Y.; supervision, G.Y. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data supporting this study are derived from work conducted as part of the author's PhD dissertation, titled "Language teachers use/non-use of ICT in teaching and learning in Kazakhstan in a single university", completed at the University of Warwick. The dissertation is publicly accessible via the Warwick Research Archive Portal (WRAP) at <https://wrap.warwick.ac.uk/id/eprint/165786/>.

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Conflicts of Interest

The authors declare no conflict of interest.

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