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Lecturers' perspectives on the use of AR filters in higher education in Kazakhstan

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ABSTRACT

This article presents the results of a qualitative study analyzing the readiness of lecturers at Kazakhstani universities to use augmented reality (AR) filters on social media as a pedagogical tool. The theoretical framework was provided by the European digital competence framework for educators (DigCompEdu). Empirical data were collected through semi-structured interviews with 13 lecturers teaching 'information and communication technologies' (ICT), representing four universities with varying statuses and teaching experience ranging from 1 to 37 years. The analysis was carried out using thematic coding based on the conceptual domains of DigCompEdu. It was found that teachers perceive AR filters primarily as an effective means of increasing student motivation and engagement, as well as a tool for formative feedback. This study is the first to examine AR filters on social media and aims to identify the discrepancy between teachers' pedagogical intuition and their underdeveloped capacity to adapt resources and plan assessments. The study highlights the need for support for institutional systems, targeted training in AR content creation, and the establishment of communities.

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1. INTRODUCTION

Academics report a decline in student motivation and engagement during assessments even as students operate in learning environments saturated with interactive technology. Despite this saturation, these technologies are rarely utilized in lectures, and a robust framework for formative assessment remains absent. Augmented reality (AR) filters, which function as digital overlays on a user's face or surroundings viewable through social media sites (Instagram, TikTok, and Snapchat) and mobile phones, have been studied, yet their pedagogical applications remain largely unexplored.

Existing research on AR application in education primarily focuses on technical aspects, science, technology, engineering, and mathematics (STEM) subjects, motivation [1]–[3], and medical training [4]. Yet, none of these studies consider AR filters in social media. Even though the application of AR in general is known to increase motivation and engagement [5], [6], the educational effect of AR in the long term has not been studied yet. Moreover, as indicated in [7], teenagers make active use of AR filters to prevent social exclusion, which makes it all the more important to investigate their possibilities in education.

Nevertheless, the empiric information from post-Soviet areas, including Kazakhstan, is missing, and there are issues related to lecturers' preparedness, formative assessment opportunities, and the influence of teaching experience. The results of this research are also internationally significant as the suggested diagnostic tool allows to identify universal digital competences gaps. In this context, the necessity of development of content adaptation and assessment design skills can be applied to the education system of various parts of the world and thus enrich international practice of training teachers to work with AR tools and social media.

Three major contributions are offered by this research: i) it gives the first empiric data on AR filters in post-Soviet higher education and hence expands the geographical framework of AR studies; ii) it applies the digital competence framework for educators (DigCompEdu) model as a diagnostic tool for identifying discrepancies in competences instead of simply characterizing their level; and iii) it identifies the crucial discrepancy between lecturers' natural pedagogical advantages (such as motivational and engagement skills) and their weaknesses in content adaptation and assessment. The implication from this result is that institutional rather than individual challenges constitute the main obstacle for sustainable implementation. Continuing these contributions, this paper presents the first empirical results about the use of AR filters in the higher education of Kazakhstan. In particular, the paper employs the DigCompEdu framework not as a tool of classification but as a tool for uncovering structural disparities between AR competences and teaching process, particularly focusing on assessment and teaching experience.

The purpose of this research is the analysis of the characteristics of the use of AR filters in social networks in the educational process in Kazakhstani universities. The paper analyzes the level of readiness, digital skills, and professional attitudes of lecturers, and the potential of AR filters in teaching and assessment. This work contributes to the conceptualization of AR filters as a pedagogical tool within the framework of the European digital competence framework DigCompEdu for teachers [8]. To systematically address these gaps, the following research questions were posed within the scope of this study:

- What are the perceptions of teachers at Kazakhstani universities regarding the pedagogical potential of AR filters on social media, and their readiness to use these tools?
- What factors determine teachers' attitudes towards AR filters and the nature of their use in teaching?
- To what extent do teachers view AR filters as a means of formative assessment, and what obstacles do they perceive to their systematic integration into assessment practice?
- Which elements of DigCompEdu are most prominently evident or, conversely, lagging behind when working with AR filters in this context?

2. THEORETICAL FRAMEWORK

2.1. DigCompEdu as a conceptual framework for the study

In this study, DigCompEdu will be used not only as a taxonomy, but also as an analytical tool in order to highlight the discrepancies between the inherent capabilities of AR filters and the current lack of systematic approaches to their application in formative assessment and sustainable instruction. Specifically, five out of six domains of DigCompEdu are analyzed: professional engagement; digital resources; teaching and learning; assessment; and empowering learners. Thus, DigCompEdu serves to illustrate the misalignment between the capabilities of AR filters and current pedagogical practices. Unlike the previous studies [9], [10], which reveal barriers to AR application, it is shown here that the main unexploited potential lies in using AR filters for assessment purposes and developing sustainable teaching approaches.

2.2. Teachers' teaching experience and digital literacy in the context of professional collaboration (DigCompEdu)

Previous studies indicate that factors such as confidence levels and pedagogic context can be important in relation to digital literacy, but without considering AR filters in social media contexts [11]–[14]. The current research aims to identify ways in which experience and professional attitude can enhance or hinder the incorporation of AR filters, taking into account distinctions made in terms of being new to or experienced with teaching roles.

2.3. The pedagogical component of digital technology use in the context of teaching and learning (DigCompEdu)

Despite research findings that show collaborative approaches to using AR yield considerable effects on learning [3] and further work on methodology is still needed [13], the issue of integration of AR filters within social media has not been adequately studied yet. In this study, the concept "teaching and learning" is defined by two codes: "teaching and learning" and "teaching method," which include the methods proposed by teachers for utilizing AR filters (motivational triggers, focus shift, and differentiation).

2.4. The role of AR filters in the context of digital resources and the digital transformation of higher education

"Digital resources" from the DigCompEdu framework is operationalized through three coding variables: "feedback" (diagnostic use), "modification" (modification of content or function), and "adaptation" (personalization of pre-fabricated filters to fit a certain lesson plan). The coding reflects the continuum from consumption to adaptation of digital resources. It has been proven that animation-AR enhances cognitive performance [15]. Yet, the distinctive features of social media AR filters are still largely understudied.

"Assessment" from the DigCompEdu framework is operationalized through two variables: "assessment" and "strategy." Even though there is plenty of evidence regarding the positive impact of digital assessments on learning [16]–[18], along with the identified barriers in adopting technologies in teaching [19], research on the barriers related to the implementation of AR filters for assessment purposes in social media settings is underrepresented [20]–[24]. This paper is devoted specifically to barriers and strategies regarding AR filters in higher education. Figure 1 summarizes the links between each DigCompEdu domain is linked to the research focus and coding categories.

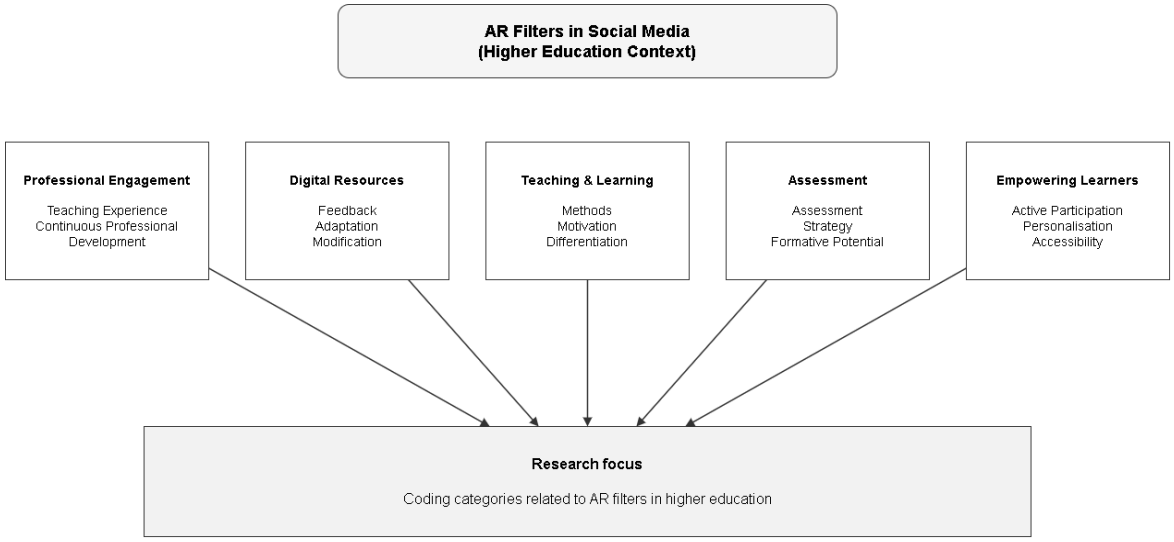


Figure 1. Conceptual framework linking DigCompEdu domains to the analysis of AR filter integration in higher education

3. METHOD

3.1. Data collection procedure, inclusion/exclusion criteria

Data were collected through semi-structured interviews, following a pre-defined set of research questions while maintaining a flexible delivery order. This format allowed for flexibility in responding to the situation at hand, participants' reactions and opinions, as well as new topics that arose during the interviews [25]. The analytical data were interpreted through the lens of DigCompEdu as a framework for understanding digital pedagogical competence, which enabled the results to be compared with an internationally recognized model.

The study is qualitative in nature and aims to identify: i) the use of AR filters on social media in terms of teachers' readiness and digital skills; ii) their professional attitudes and practices; and iii) the potential of AR filters as a tool for assessing knowledge and a sustainable element of pedagogical practice. Individual interviews made it possible not only to record but also to trace the context of implementation, as well as to identify hidden barriers and professional meanings. The interviews were conducted in person and recorded on a voice recorder with the participants' consent. Participants were informed that their responses would be transcribed verbatim and that all personal identifiers would be removed to ensure anonymity. The names of all participants were anonymized. The research protocol was examined and approved by the Research Ethics Committee at L.N. Gumilyov Eurasian National University (Ethical Approval Number 15, 15.12.2025). All procedures, i.e., informed consent, recording, anonymization, and storing of data were conducted strictly according to the instructions from the committee.

The choice of semi-structured interviews was driven by the need to compare the responses of different teachers using a common thematic structure of questions, whilst maintaining a flexible approach to follow-up questions. The research design is based on the evidence-based concept of digital competence in education, DigCompEdu. Participants were selected in accordance with a strategy based on their experience of using AR filters in the teaching process or on testing such filters. Inclusion criteria: i) university lecturers; ii) informed consent to participate and to be audio-recorded; and iii) the ability to test or experience of using AR filters on social media for educational purposes. A standardized screening procedure was implemented prior to the interviews to exclude participants who did not meet the inclusion criteria. Main exclusion criteria: lack of teaching activity, complete lack of knowledge about AR filters, refusal to participate and to be audio-recorded.

The sample represents a wide range of teaching experience, from 1 to 37 years, which allows for an analysis of the perception of innovations at the intersection of digital readiness and professional experience. The age of the participants was not specified, as the focus was on teaching experience. The interview questions comprised 11 open-ended questions concerning teaching experience, self-assessment of digital skills, the pedagogical usefulness of AR filters on social media, interaction with students, pedagogical attitudes, the potential for evaluating AR filters on social media, and the degree of adaptation in the context of pedagogical tasks.

The study involved 13 teachers from Kazakhstani universities of national and regional status: five teachers from L.N. Gumilyov Eurasian National University, two from Alkey Margul Pavlodar Pedagogical University, three from West Kazakhstan University of Innovation and Technology, and three from the A.K. Kusainov Eurasian Institute of Humanities. During the data collection process, thematic saturation was achieved after the 11th interview, as the two subsequent interviews did not introduce any fundamentally new codes, confirming the adequacy of the sample [26]. All respondents teach the information and communication technologies (ICT) course, which ensures homogeneity in terms of the baseline level of digital competences and allows us to focus on differences related to teaching experience and professional attitudes. The restriction of the sample to ICT teachers is deliberate: it is this group that is most knowledgeable about digital tools and AR technologies, which helps to avoid biases associated with a lack of awareness of AR.

3.2. Data coding and analysis procedure based on DigCompEdu

The interviews were transcribed verbatim and then standardized into a uniform format. All identifying data in the text were anonymized. Each transcription was assigned a unique identifier, and ‘meaning units’ were highlighted in the text. Coding was carried out at the level of meaning units. The analysis involved three levels of coding: open, axial and selective. Open coding was carried out line by line, with each meaning unit was assigned codes that closely aligned with the raw data, facilitating the generation of an initial codebook in accordance with the logic of thematic analysis. At the next level, the codes were grouped into larger categories (axial coding), after which, at the selective coding level, the categories were integrated into final themes and sub-themes corresponding to the research questions. First, the codebook as shown in Table 1 was developed separately by two researchers on the basis of the first five transcriptions. Independent coding resulted in 86% concordance in the application of codes to meaning units. The discrepancies (14%) occurred mainly in the distinction between “modification” and “adaptation” codes (such as when one changes the content of a filter or modifies its use in a lesson). All discrepancies were resolved through consensus during team discussions. For example, one researcher categorized a teacher’s comment, “I would change the questions inside the filter”, as “modification”, while the second researcher classified it as “adaptation”. Upon discussion of the definitions of codes, it was agreed that “modification” referred to modifications in the content of filters (e.g., changing questions), while “adaptation” referred to changes in the pedagogical context of using filters, but not in their content. The distinction was included in the codebook.

Table 1. Codebook and frequency of code mentions by DigCompEdu domain

Domain	Code	Description
Professional engagement	Teaching experience	Practical teaching experience influencing innovation perception.
	Professional development	Commitment to ongoing skill acquisition.
Digital resources	Feedback	Diagnostic use of AR filters.
	Modification	Changing content or functionality.
	Adaptation	Tailoring resources to lesson objectives.
Teaching and learning	Teaching practice	Pedagogical methods and organization.
Assessment	Assessment	Use of AR filters for knowledge checks.
	Strategy	Systematic planning of assessment procedures.
Empowering learners	Active involvement	Increased student engagement.
	Personalization	Addressing individual learner needs.
	Accessibility	Technical availability of the tool.

Credibility was enhanced through investigator triangulation: two of the three authors independently coded the first five transcripts, achieving 86% agreement on code application, with all discrepancies resolved through consensus discussion involving the third author. Thematic interpretations were tested with two participants as a form of member checking, who verified that these interpretations were indeed congruent with their experiences and views. Dependability was ensured through an audit trail which included interviews recording, verbatim transcripts, exhaustive codebooks, and documents describing coding process and decisions taken by the research team. It provides an opportunity for outside observers to track the entire process of analysis from primary data to final themes.

Confirmability was ensured through reflexive methodology: all three authors kept reflexive journals throughout the entire process of data collection and analysis where they documented their starting assumptions and possible biases and ways how these may affect their interpretations. Finally, all interpretations are rooted in data, and every theme can be traced to initial meaning units. Transferability is achieved through a thick description of research context which includes teaching experience of participants (from 1 to 37 years), type of institutions (national and regional universities), and specific digital environment (social media AR filters). This detailed contextual information enables readers to assess the applicability of findings to similar higher education settings. The final structure of the codebook comprised five key categories in accordance with the DigCompEdu framework.

This study was deliberately limited to the semi-structured interview method, as the main aim was to identify subjective meanings, professional attitudes and hidden barriers that teachers associate with the use of AR filters. Interviews allow for the collection of in-depth data on motivation, reflection and self-assessment, which is difficult to achieve through observation or document analysis. Observation of lessons was not planned, as at the time of data collection most teachers were in the early stages of testing AR filters, and their systematic use had not yet been established. The inclusion of additional sources (such as an analysis of lesson plans or pupils' work) could have provided further information; however, this falls outside the scope of the study, which focused specifically on teachers' opinions and readiness. Thus, the interview method alone is sufficient to achieve the research objectives.

4. RESULTS

Analysis of interviews with teachers at Kazakhstani universities revealed key characteristics of their professional engagement in the context of using AR filters integrated into social media. Teaching experience, ranging from 1 to 37 years, was identified as a significant analytical variable, enabling the identification of patterns of engagement at different stages of the professional career. These comments show that there is an intersection with other spheres of professional activities, such as the use of digital resources, organization of teaching, and educational communication. The results are presented according to the research questions posed.

4.1. Teaching experience as a factor in professional engagement

Young lecturers drew attention to the proactive search for modern digital resources. The participant with one-year experience says:

> "*I am just starting my professional career, so I am looking for modern tools to make my lessons more interesting and effective*."

However, at the same time, young teachers assessed their skills in using digital resources as average. Teachers with the experience ranging from eight to 17 years reflected upon their experiences. For instance, one of these participants, who had been working for eight years says:

> "*During this time, I have worked with students in various teaching formats and have constantly strived to incorporate modern digital tools*."

Participants who had more than twenty years of experience shared their opinions about the ever-changing digital world. One respondent who taught for 26 years stated that "*I'm not sure I know everything 100%.*" Another respondent who has been teaching for 25 years shared her experience overcoming an inner barrier:

> "*At first, there was resistance. I thought: 'What's so special about using social media?' But then I became interested in it myself*."

The respondents with the most experience (37 years) confessed that they were limited by time and the necessity of knowledge update. It can be concluded that experience does not play a linear role in being open to the use of AR filters; on the contrary, it is the route of reflection from skepticism to conditional acceptance.

4.2. Self-assessment of digital skills and reflective analysis of professional experience

Participants viewed their professional skills as above average or high; however, they were aware of the fact that the digital environment is changing constantly. Most participants evaluated themselves as having above average professional skills, with several of them justifying their self-evaluation through peer recognition as the confirmation of their professionalism. Some participants who considered themselves as having high professional skills mentioned recognition from peers as well: "*in general, people at the entire university ask questions regarding these particular ICT tools*." It is important to mention that the educational value of the social media tool emerged unexpectedly for the participants. High self-assessment of teachers' professional skills is balanced by reflective understanding of digital environments' changing character.

4.3. Attitudes towards innovation: from resistance to acceptance

In their responses during the interviews, the respondents have identified a change in their attitudes towards the use of AR filters. While the novice teachers were initially open to using the tool, more experienced teachers went through the process from skepticism to acceptance and, at times, even enthusiasm based on hands-on experience with the tool. Some of the experienced teachers reported a change in their attitude from skepticism to acceptance and, sometimes, even to enthusiasm. One of the experienced teachers, with 27 years of experience, had an altogether different attitude: "*If it takes me a little time, I can use it from time to time*." New teachers were much more open to new methods initially. Change of attitude is achieved through practice and not just theory. The experienced teachers are practical in their approach, and adoption hinges on value and efficiency.

4.4. Continuous professional development as a value

Several participants have expressed their need for continuous learning and acquiring new skills, but there were those who had doubts about the pedagogical effectiveness of AR filters. Some teachers stated that they would feel more confident using AR filters when being able to produce their own material, and not only use pre-existing material-this indicates the need for training in the field of content creation. Teachers stated their intention to go from being mere consumers to becoming producers of AR material–this intention currently does not correspond to the level of institutional assistance, which means that it is an untapped potential for professional development.

4.5. Domain of 'digital resources'

In the domain of 'digital resources' three critical codes were considered, namely feedback, modification, and adaptation. Teachers mentioned that there is the possibility of diagnosing students using AR filters. Also, several individuals indicated that there was a change in the way social media was viewed; initially viewed as distracting but later realizing its learning possibilities when it is well-organized. In addition, some teachers indicated their need to modify the filter system to include subject-related terminologies and concepts. Although teachers possess strong abilities of adaptation and feedback, their modification ability is lacking greatly. This imbalance means that they operate at an 'integrator' level in DigCompEdu framework and not an 'expert'.

4.6. The 'teaching and learning' domain

The 'teaching and learning' domain groups together the statements related to instruction design and pedagogy. The teachers unanimously pointed out motivational enhancement and attention redirection as the main objectives of AR filters. Frequency analysis demonstrated that the code categories 'teaching and learning' (47 times) and 'teaching method' (46 times) repeatedly appeared throughout the whole data set, not being characteristic of any specific sub-group only. Also, the educators referred to the implementation of AR filters into various pedagogical approaches, and most of the teachers agreed about their motivational nature that could keep the learners involved. AR filters could have motivational potential since they keep learners engaged.

One of the participants was concerned with learners' ability to focus on learning, stating:

> "*You can hold their attention for five minutes, and then they start to get distracted when you use a traditional method, it's boring-just text or a presentation*."

Moreover, one interviewee suggested involving learners in the development of topic-based AR filters, an approach that is innovative in its move away from conventional use of standardized commercial materials. Learner individuality was mentioned by several respondents as something to be taken into account. One of them noted that "*It depends on the students. for some it's distracting, whilst others take it in their stride*."

Pedagogical applications of AR filters are intuitive and motivational rather than systematically planned. While this reflects strong learner-centered instincts, it highlights the need for deliberate instructional design.

4.7. The domain of 'assessment'

Interviewing lecturers from universities in Kazakhstan brought up various perceptions related to the usage of AR filters in order to assess learning outcomes. According to frequency analysis, the code of 'assessment' is found 24 times whereas the code of 'strategy' was mentioned three times. Out of 13 respondents, 10 said that AR filters were efficient in terms of being formative tools of checking achievements such as quick observations and self-assessment of learners. One teacher, who had eight years of experience, indicated lower stress levels in using AR filters, saying that "*AR filters make the assessment process less stressful*." However, a number of lecturers doubted the effectiveness of assessment using AR filters, thinking of AR filters as of quick verification or stimulus tools instead of evaluative ones. Awareness of AR filters' formative value (24 mentions) sharply contrasts with lack of strategy (3 mentions), which proves that teachers know what AR filters are able to do but have no strategy of using them.

4.8. The empowering learner's domain

The frequency analysis shows that the code "active participation" is the most frequent one throughout the entire sample. Teachers mentioned that the familiar social media format aroused interest among students and inspired them to get engaged, even the passive ones. All 12 of 13 participants claimed that the use of the AR filters was positively received by their learners and stimulated their engagement. According to them, the format was inspiring for students, who were interested in engaging in activities because it was familiar from the social media context. As one teacher noted: "*when they were taking tests, they interacted more with each other in class and chatted*." Personalization (11) code is less frequently used. A few teachers mentioned that individual qualities and preferences of students determine the efficiency of use of AR filters. The 'accessibility' (8) code was associated with the technical aspect. It was noted by educators that AR filters work through the social media applications with which students are already familiar, therefore do not need any special software or devices. Issues arose with the internet connection and performance of filters on different models of phones. Teachers regarded them as operational difficulties. A few respondents mentioned that effectiveness depends on the age of students and their readiness. For the first-year students the gamified approach was referred to as a natural and efficient format. Even though there were some technical difficulties mentioned, teachers mostly regarded them as operational ones, not fundamental obstacles. Active participation is the best developed competency, while personalization and accessibility are yet underexplored.

5. DISCUSSION

Based on the results obtained, it is possible to paint a multifaceted picture of how AR filters not only are perceived by teachers at Kazakhstani universities, but also to understand the practice of using these tools. Using the DigCompEdu analysis, we can identify both rapidly developing areas of digital competence and aspects where there is a clear gap between the potential of the technology and its actual application.

5.1. Professional engagement: experience, reflection and acceptance of innovation

Professional experience emerged as an important variable affecting respondents' views on AR filters in a nonlinear manner. Teachers with less experience were found to show openness to innovation in terms of their willingness to test and apply technology-related tools to support learning in the class. Professional experience, rather than acting as a barrier to technological progress, became a catalyst facilitating the reflexive process of innovativeness and its adoption among participants. These findings extend the results of Perifanou *et al*. [9], who identified lack of awareness about the technology in question as one of the main obstacles to its adoption. The current research shows that firsthand experience helped many respondents progress from reluctance or indifference to enthusiasm for using AR filters—an effect not previously documented in AR studies. This finding is consistent with Ertmer and Ottenbreit-Leftwich [19], who argue that barrier navigation is achieved through personal experience. Self-rated digital competence was generally high among participants; however, their reflections on that competence were notably self-aware. Most respondents who claimed advanced knowledge reported receiving peer recognition for their competencies. Considering the definition of digital competencies presented by DigCompEdu framework, such reflections on and recognition of expertise can be viewed as a representation of professional engagement with technology. In particular, even highly experienced teachers proved to be open to innovative approaches. Unexpectedly, teachers perceived social media as an educational resource for themselves, indicating a willingness for continued professional development that they viewed as integral to their practice.

Different patterns of professional engagement were revealed during interviews. An interesting example of the criterion set by an experienced teacher was formulated in the following way–"*If it takes me a little time*." Adoption of innovation is not limited to educational considerations but also includes pragmatic and resource-related factors. Thus, professional engagement in this context can be characterized as involving intrinsic motivation, re-evaluation, and pragmatism.

From a DigCompEdu perspective, this finding illustrates that area "professional engagement" is not solely about technical skills but encompasses reflective practice and the ability to reconceptualize teaching identity. The non-linear relationship with experience suggests that competence development in this area is iterative rather than cumulative. The current research makes a substantial contribution to knowledge of the relationship between professional experience and innovation acceptance by proving that experience, contrary to what was believed before, works as an enabler rather than inhibitor.

5.2. Digital resources: from feedback to modification

Concerning digital resources, feedback turned out to be the most important criteria. The participants valued the possibility to use AR filters for diagnostic purposes and immediate gap detection. Nevertheless, this research proves that although the teachers understand this diagnostic potential in AR filters, the feedback they give is superficial as compared to the formative assessment approaches that have already been used [17], [18].

With regard to the "adaptation" competence, it has been found out that teachers were willing to modify the resource to suit their class needs rather than to use it "as is". The qualitative analysis provided some evidence of how teachers changed their attitude from seeing social media as distractive tools to educational tools. Modifications of AR filters (changes to content and modifications of filters' functionalities) were observed significantly less often than other mentioned competencies. Even though some teachers regarded themselves as content creators, the described competency seems to be poorly developed due to a deficiency of skills rather than unwillingness to create. Following the DigCompEdu taxonomy, modification of resources falls into the category of competencies following adaptation [8], [12]. This gap between adaptation and modification aligns with DigCompEdu's progression levels: teachers at the 'integrator' stage can adapt resources, but reaching 'expert' level requires the ability to create and modify digital content-a step demanding targeted institutional support. The results reveal an important discrepancy between adaptation and modification competences where teachers are at the 'integrator' level of DigCompEdu but have not yet achieved the necessary 'expert' level for creating content.

5.3. Teaching and learning: motivation, attention and contextuality

Teachers recognized AR filters as highly motivating tools, given their strong association with the technologies that students currently use, particularly social media. However, while this finding confirms earlier research indicating that AR enhances motivation for learning [3], [27]–[29], this study goes beyond previous research in establishing that attention redirection is equally crucial, as well as depending on several contextual issues such as student profile and instructional methods. Moreover, attention-related challenges were identified, as learners do not necessarily pay more attention simply because the format has changed. Therefore, successful implementation of this innovative technology requires the use of appropriate teaching techniques. Differentiation was also emphasized, suggesting that successful use of AR filters depends on selecting the appropriate format for each group of learners.

While teachers employ effective motivational strategies, the data suggest that these are often applied intuitively rather than systematically. DigCompEdu emphasizes that competent educators should not only engage learners but also critically select pedagogical approaches based on learning objectives–a dimension that remains underdeveloped here. This research reveals the spontaneous rather than deliberate use of motivational strategies. Despite the successful use of motivational strategies by teachers, their key ability to select proper teaching strategies according to desired results remains underdeveloped in DigCompEdu.

5.4. Assessment: recognition of potential and lack of strategy for its use

Results concerning the assessment domain contain an obvious contradiction. Despite a good understanding of AR filter potential in terms of formative assessment (24 occurrences), little consideration is given to the actual use of AR filters as a tool for formative assessment (3 occurrences). Concerns about the quality of AR-based assessment fit into the context of the whole discourse on digital assessment. The presence of appropriate tools does not guarantee their pedagogically correct application. This problem is especially relevant in Kazakhstan where there are no ways to implement AR filters for formative purposes.

Lack of strategic thinking on assessment implies that our participants possess declarative but not procedural knowledge. The difference between these types of knowledge is important in DigCompEdu which distinguishes 'assessment' and 'strategy' skills–the latter being a higher-level one not mastered by our participants. Our findings point to an important gap between declarative and procedural knowledge: teachers

understand the capabilities of AR filters in assessment but fail to possess the knowledge of how to implement it systematically. This research provides the first empirical insight into the problem of discrepancy between the tools and strategy of assessment on social media AR filters.

5.5. Empowering students

'Active participation' was the most frequently cited theme across all areas. Instructors agreed that AR filters serve as an effective trigger for stimulating learner attention, even among previously passive students. Additionally, informal communication and competitiveness fostered an atmosphere conducive to collaborative learning. These findings align with the key goal of the DigCompEdu framework, which aims to encourage active participation. It was noted that responses to AR filters vary among learners and that access to technology is crucial. It appears that the emphasis on observable outcomes during early adoption gradually evolves towards greater personalization and accessibility.

The two leading domains–"empowering learners" and "teaching and learning" prove that instructors apply various instructional approaches together with a strong element of analysis. On the contrary, the domain "digital resources" still exists in the same form due to its full control over feedback and adaptation but a weak potential of modification. In addition, the domain "assessment" highlights an important issue because the value of the concept cannot be fully utilized at the moment of assessment process organization.

One of the main issues in Kazakhstan is related to the existence of systems in the institutions preventing educators from implementing changes into their teaching strategies via AR filters. The results point out that it is necessary to focus on the conditions in educational institutions rather than the actions of educators themselves when developing programs aimed at improving educators' competences. Specifically, the focus must be put on the development of programs training educators in creating digital content using AR filters instead of teaching them how to use such software. Moreover, the modern educational system needs the creation of special platform where teachers can share their instructional techniques to facilitate their widespread implementation. Three main limitations associated with the research methodology used are discussed. The strong performance in "empowering learners" demonstrates that teachers intuitively foster active participation, yet the lower occurrence of 'personalization' suggests they are less adept at differentiating instruction–a skill that DigCompEdu places at the expert level.

5.6. Implications for policy and practice

The results of this research have some implications for practice, policy, and professional development at higher educational institutions. With regard to institutional policy, universities must focus on more than just access to technology by setting up proper training programs aimed at fostering skills of AR filter creation and customization among teachers. This will require not only technical training but also pedagogical support regarding implementation of AR filters into the subject curriculum and its assessment process. In terms of professional development, training must include: i) workshops aimed at learning how to design AR filters on easy-to-use platforms; ii) communities of practice where teachers can exchange their experience of using AR filters for assessment and share tips about how to do it effectively; and iii) mentoring programs involving more experienced teachers working with their less-experienced peers.

Regarding the actual practice of assessment, higher educational institutions need to create proper guidelines and frameworks for using AR filters for formative assessment purposes. With regard to national education policy, our findings recommend that national frameworks of digital competence like DigCompEdu be modified to include the specific competences of social media tools and AR technologies, especially content creation and assessment planning, which seem to be areas of weakness for our participants. Lastly, the study highlights the importance of infrastructural resources to enable sustainable integration: internet connections, compatible devices, and support services that will allow the teachers to resolve technical problems and innovate. Without the availability of such resources, even highly motivated teachers will not be able to move beyond experimentation into pedagogical practice.

6. CONCLUSION

This study reveals that Kazakhstani university lecturers demonstrate strong pedagogical and learner-centered competencies when using AR filters, yet face critical gaps in digital resource modification and strategic assessment planning. The DigCompEdu framework successfully identifies these issues, proving that the main problem is not about access to technology or age but lack of institutional support to progress from adaptation to creation and from heuristic to systematic assessment. In practical terms, institutions need to focus on: i) developing educational programs on creation of AR content in certain fields of knowledge; ii) user-friendly software for filters development without programming skills; and iii) creating communities of practice for exchanging ideas on assessment. It is important to acknowledge that due to the nature of the research (qualitative design) and its sample size, the results cannot be generalized. Further studies should be

done using quantitative experiments. Nevertheless, these findings provide a foundational basis for developing methodological support for sustainable AR filter integration within Kazakhstan's digital higher education transformation.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognise individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY

The data supporting the findings of this study are available from author, [GA], on request.

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