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TRANSPORT UNIVERSITETI**

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**“WOMEN IN INNOVATION AND SCIENCE”
XALQARO ILMIY-AMALIY KONFERENSIYA VA FORUMI
ILMIY ISHLARI TO‘PLAMI**

Toshkent davlat transport universitetida 2026-yil 27-mart kuni “Women in Innovation and Science” xalqaro forumi ilmiy ishlari to‘plami chop etildi.

Mazkur nufuzli tadbirlar O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi hamda Transport vazirligi hamkorligida tashkil etilib, mamlakatimizda ilm-fan, innovatsiyalar va zamonaviy texnologiyalarni rivojlantirish, shuningdek xalqaro ilmiy hamkorlikni yanada kengaytirishga qaratilgan muhim platforma hisoblanadi.

Konferensiya ochilish marosimida davlat organlari, xalqaro tashkilotlar va yetakchi oliy ta’lim muassasalari vakillari ishtirok etdi. Jumladan, Toshkent davlat transport universiteti rektori G‘ulomov Abdulaziz Abdullayevich, O‘zbekiston Respublikasi Transport vazirligi vakili Ulmasova Lobarkhon Adilovna, Osiyo taraqqiyot banki eksperti Claire Charnac, Istanbul Aydin universiteti vasiylik kengashi raisi Mustafa Aydin, Belarus davlat transport universiteti rektori Kazakov Nikolay Nikolayevich hamda Qirg‘iziston Respublikasi Transport vazirligi vakili Dinara Moldokalieva ishtirok etdilar.

Konferensiya ilmiy dasturi doirasida plenar va panel sessiyalar, shuningdek ilmiy ma’ruzalar taqdimoti o‘tkazilib, ularda sun’iy intellekt va raqamli texnologiyalarni iqtisodiyot va ta’limga joriy etish, transport va aviatsiya sohasida innovatsion yechimlar, sanoat va IT sohasida texnologiya transferi, shuningdek ta’limda raqamli platformalar va intellektual tizimlar kabi dolzarb masalalar yoritildi.

2026-yil 27-mart kuni o‘tkazilgan “Women in Innovation and Science” xalqaro forumi ayollar yetakchiligi, innovatsiyalar va STEM sohalariga bag‘ishlangan bo‘lib, mamlakatimizda ayollarning ilm-fan va texnologiya sohalaridagi ishtirokini kengaytirish, ularning yetakchilik salohiyatini rivojlantirish hamda xalqaro hamkorlikni mustahkamlashga qaratilgan strategik maydon sifatida tashkil etildi.

Forum doirasida ayollar yetakchiligini rivojlantirish va rag‘batlantirish, xalqaro tajriba almashinuvi va ilmiy tarmoqlarni kengaytirish, yosh tadqiqotchi ayollar va PhD talabalarni qo‘llab-quvvatlash hamda innovatsion ekotizimlarda gender tenglikni ta’minlash kabi ustuvor vazifalar amalga oshirildi. Shuningdek, forumda ayollar yetakchiligi va STEM, gender tenglik va ilm-fan institutsional rivoji, ayollar tadbirkorligi va innovatsion startaplar, innovatsiya ekotizimlari va xalqaro hamkorlik, yosh ayol tadqiqotchilarni rivojlantirish, mentorlik va akademik tarmoqlar yo‘nalishlarida tematik sessiyalar tashkil etildi.

Forumda davlat organlari, xalqaro tashkilotlar, yetakchi oliy ta’lim muassasalari va ilmiy markazlar vakillari, jumladan “OLIMA” uyushmasi raisi Murtazayeva Raxbar Hamidovna, “Sharq ayoli” xalqaro ayollar jamoat fondi raisi Tursunbayeva Saodat Gafurovna, Osiyo taraqqiyot banki eksperti Claire Charnac, O‘zbekiston Respublikasi Transport vazirligi vakili Ulmasova Lobarkhon Adilovna, Toshkent davlat transport universiteti rektori G‘ulomov Abdulaziz Abdullayevich, Qirg‘iziston Respublikasi Transport vazirligi vakili Dinara Moldokalieva hamda Indoneziyadan universitet dekani Yoga Prihatin ishtirok etdilar.



Shuningdek, forumda Yevropa va Osiyo davlatlaridan yetakchi olimlar, ekspertlar va yosh tadqiqotchilar keng qatnashdi.

Forum dasturiga ochilish marosimi, panel muhokamalar, ilmiy chiqishlar hamda professional rivojlanish bo'yicha workshoplar kiritilgan bo'lib, ular doirasida gender tenglik, ayollar karyerasini rivojlantirish, ilmiy tadqiqotlar va innovatsion boshqaruv bo'yicha amaliy seminarlar tashkil etildi.

Mazkur tadbirlar Osiyo taraqqiyot banki (ADB), "OLIMA" — O'zbekiston xotin-qizlar olimlari uyushmasi, "Sharq ayoli" xalqaro ayollar jamoat fondi, Germaniya xalqaro hamkorlik jamiyati (GIZ), shuningdek Rossiya, Turkiya, Indoneziya va Qirg'iziston oliy ta'lim muassasalari hamda Belarus Milliy fanlar akademiyasi ilmiy institutlari hamkorligida o'tkazildi.

Mazkur xalqaro ilmiy-amaliy konferensiya va forumning ahamiyati shundaki, ular xalqaro ilmiy hamkorlikni mustahkamlash, innovatsion ishlanmalarni amaliyotga joriy etish, raqamli va barqaror rivojlanishni ta'minlash, shuningdek ayollarning ilm-fan va innovatsiya sohalaridagi rolini kuchaytirishga xizmat qiladi. Shu bilan birga, mazkur tadbirlar yosh olimlar va tadqiqotchilarni qo'llab-quvvatlash, ilmiy tajriba almashish hamda global ilmiy makonga integratsiyalashuvni jadallashtirishda muhim ahamiyat kasb etadi.

Mazkur xalqaro ilmiy-amaliy konferensiya va forumning maqsadi zamonaviy ilmiy tadqiqot yo'nalishlarini muhokama qilish, innovatsion yondashuvlar va ilg'or texnologiyalar bo'yicha ilmiy natijalar almashuvini ta'minlash, shuningdek xalqaro ilmiy hamkorlikni rivojlantirishdan iboratdir.

Tadbirda O'zbekiston Respublikasi hamda xorijiy mamlakatlarning oliy ta'lim muassasalari va ilmiy-tadqiqot institutlari olimlari, shuningdek amaliyotda muhim natijalarga ega bo'lgan mutaxassislar o'z ilmiy ishlari bilan ishtirok etdilar.

Ushbu ilmiy to'plamda muhandislik, transport, raqamlashtirish, sun'iy intellekt, innovatsion boshqaruv, gender tenglik va barqaror rivojlanish sohalarida faoliyat yuritayotgan yetakchi olimlar, professor-o'qituvchilar va tadqiqotchilarning ilmiy ishlari jamlangan. To'plamda dolzarb ilmiy muammolar, zamonaviy yechimlar, nazariy va amaliy tadqiqot natijalari yoritilib, ushbu yo'nalishlarning bugungi holati va istiqboldagi rivojlanish tendensiyalari aks ettirilgan.

Mazkur nashr mamlakatimizda ilm-fan va innovatsion rivojlanishni ta'minlash, xalqaro ilmiy aloqalarni mustahkamlash hamda yosh olimlar va tadqiqotchilarni qo'llab-quvvatlash yo'lidagi muhim qadamlardan biri sifatida e'tirof etiladi.

Shuningdek, mazkur ilmiy to'plamda keltirilgan natijalar kelgusida ilmiy tadqiqotlar samaradorligini oshirish, amaliyotga yo'naltirilgan innovatsion yechimlarni keng joriy etish hamda sohalararo integratsiyani chuqurlashtirish uchun muhim ilmiy asos bo'lib xizmat qiladi. To'plam materiallari nafaqat ilmiy jamoatchilik, balki ishlab chiqarish sohasi mutaxassislari, doktorantlar va talabalar uchun ham foydali manba hisoblanadi.

Mazkur nashrda yoritilgan ilmiy g'oyalar va ilg'or yondashuvlar asosida yangi ilmiy izlanishlar olib borilishi, xalqaro ilmiy aloqalarning yanada rivojlanishi hamda innovatsion rivojlanish strategiyalarining takomillashishiga xizmat qilishi kutilmoqda.



Theoretical foundations and practical experience of using Mentimeter WordCloud application in Uzbek language classes for higher education students

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Abstract:

The integration of interactive digital tools in higher education plays an important role in enhancing student engagement and instructional effectiveness. This study examines the theoretical foundations and practical implementation of the Mentimeter WordCloud feature in Uzbek language classes using a quasi-experimental design involving 50 third-year students divided into control and experimental groups. Over four instructional sessions, the experimental group engaged in real-time WordCloud-based activities, while the control group received traditional instruction. Comparative analysis showed higher mean performance in the experimental group ($M = 4.5$) compared to the control group ($M = 3.8$), along with increased levels of reported engagement and participation. The study also outlines a basic digital workflow involving real-time response collection, aggregation, and word-frequency visualization. The findings indicate that structured WordCloud integration can support cognitive engagement, collaborative discussion, and formative feedback in language instruction.

Keywords:

mentimeter, WordCloud visualization, applied educational technology, quasi-experimental study, student engagement analytics, higher education, Uzbek language instruction, digital pedagogy

1. Introduction

The ongoing digital transformation of higher education has significantly reshaped pedagogical practices, prompting the integration of interactive technologies into instructional design. Contemporary educational paradigms increasingly move away from transmissive models of knowledge delivery toward constructivist approaches that emphasize active knowledge construction, learner autonomy, and collaborative meaning-making. Within this framework, digital tools are not merely technological supplements but pedagogical instruments that can facilitate deeper cognitive engagement and structured knowledge development.

Constructivist learning theory (Piaget; Bruner; Vygotsky) posits that learning is an active process in which learners construct knowledge through interaction with content, prior experience, and social context. Knowledge is not passively received but actively built through reflection, dialogue, and cognitive restructuring. Therefore, instructional strategies aligned with constructivism require tools that promote interaction, visualization, and collaborative participation. Interactive digital platforms have the potential to operationalize these principles in higher education settings.

An important theoretical dimension supporting the integration of visual interactive tools is Cognitive Load Theory (Sweller), which emphasizes the need to manage learners' limited working memory capacity. Effective instructional design reduces extraneous cognitive load while enhancing germane processing. Visual structuring of information—particularly through graphical representation—can facilitate semantic organization, improve retention, and strengthen conceptual clarity. Similarly, principles of Multimedia Learning (Mayer) suggest that combining verbal and visual channels enhances comprehension through dual coding and integrative processing.

In this context, knowledge visualization tools such as WordCloud technology present a promising pedagogical solution. A word cloud aggregates textual responses and

visually represents the frequency of key terms, with more frequent words displayed more prominently. This dynamic visualization enables rapid identification of dominant concepts, collective interpretation patterns, and semantic clusters within a group. From a cognitive perspective, such visualization supports conceptual structuring and collective reflection. From a socio-constructivist perspective, it promotes shared meaning-making and dialogic interaction.

Mentimeter, a cloud-based interactive presentation platform, integrates a WordCloud feature that allows real-time collection, aggregation, and visualization of student responses. Unlike traditional oral questioning, this format encourages broader participation, including contributions from students who may experience communicative anxiety in conventional classroom discussions. The anonymity and immediacy of digital input can foster equitable participation and increase behavioral and emotional engagement.

In the context of Uzbek language instruction in higher education, the use of interactive visualization tools remains underexplored. Language learning requires not only acquisition of lexical units but also the development of semantic networks, conceptual clarity, and communicative competence. Although digital platforms are increasingly available in university settings, empirical research examining the pedagogical impact of WordCloud-based visualization on cognitive engagement, participation, and academic performance in Uzbek language classrooms is limited.

Thus, a significant research gap exists in understanding how structured integration of interactive visualization tools influences student engagement and learning outcomes within language education in post-Soviet higher education contexts. Existing studies primarily describe digital tools functionally but lack systematic empirical evaluation grounded in educational theory.

The present study aims to investigate the pedagogical potential of the Mentimeter WordCloud feature in Uzbek language instruction at the tertiary level. Specifically, it seeks to:



1. Theoretically justify the integration of WordCloud-based visualization within constructivist and cognitive load frameworks;
2. Empirically examine its impact on student engagement and academic performance through a quasi-experimental design;
3. Propose a structured model for integrating interactive visualization into higher education language classrooms.

2. Research methodology

Interactive learning

Interactive learning is an educational approach that emphasizes students' active engagement, collaboration, and critical thinking within the learning process. Unlike traditional passive instruction, which often relies on lecture-based delivery, interactive learning positions learners as active participants who engage with content, peers, and instructors through discussion, problem-solving, and reflective activities. This approach supports deeper understanding and enhanced knowledge retention by promoting engagement and participatory learning.

Mentimeter platform and WordCloud functionality

Mentimeter is a cloud-based interactive platform that enables educators to create live polls, quizzes, surveys, and visualizations to enhance audience participation. One of its most popular question types is the WordCloud slide, which dynamically displays the most frequently submitted words from audience responses in a visual cloud format. Words with higher response frequency appear larger and more prominent, allowing quick identification of dominant ideas within a group discussion. This feature supports rapid aggregation and visualization of participant input, making it valuable for brainstorming and collective reflection activities in educational settings.

PRACTICAL IMPLEMENTATION AND METHODS

Research design and participants

The study employed a quasi-experimental design and was conducted during the 2024–2025 academic year at Samarkand State Pedagogical Institute. Two third-year undergraduate groups ($n = 25$ each) participated in the study. The groups were formed according to the existing academic structure, and no substantial differences in academic performance were observed prior to the intervention.

The experimental group integrated Mentimeter WordCloud during the introductory stage of lessons, whereas the control group received traditional lecture-based instruction combined with oral questioning. The intervention lasted one month and included four instructional sessions.

Research methods and instruments

The research employed a theoretical analysis of literature related to interactive learning and digital pedagogy, alongside a quasi-experimental comparison of instructional approaches between experimental and control groups. To evaluate student engagement and satisfaction, a post-lesson survey based on a 5-point Likert scale was administered. The collected data were analyzed using descriptive statistical methods, focusing on the comparison of mean performance indicators between the two groups.

Lesson design and digital workflow

In the experimental group, each lesson began with an open-ended question entered into the Mentimeter WordCloud slide. Students submitted responses via personal devices (smartphones or tablets). The platform collected

responses in real time and automatically calculated word frequency.

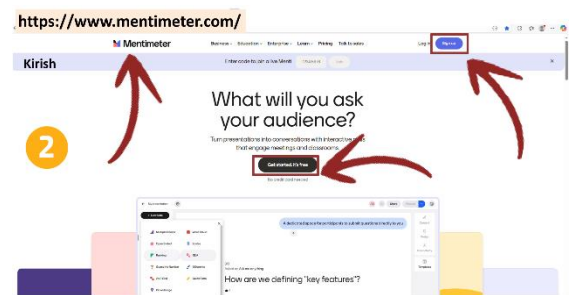


Fig. 1. General overview of the Mentimeter platform interface and the registration process for creating interactive presentations

The resulting WordCloud visualization dynamically displayed the most frequently repeated words, with word size corresponding to response frequency. The instructor then facilitated discussion based on the visualization, identifying dominant ideas and clarifying conceptual understanding.

In the control group, the same topic was introduced through conventional explanation and oral discussion without digital visualization tools.

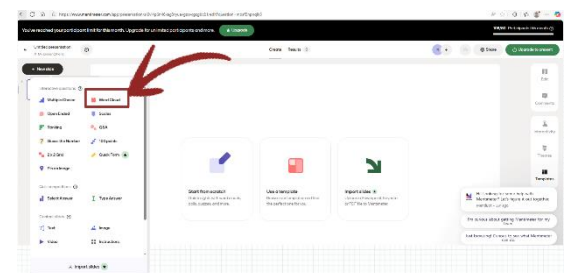


Fig. 2. Mentimeter platform interface demonstrating the selection of the WordCloud question type for creating interactive classroom activities

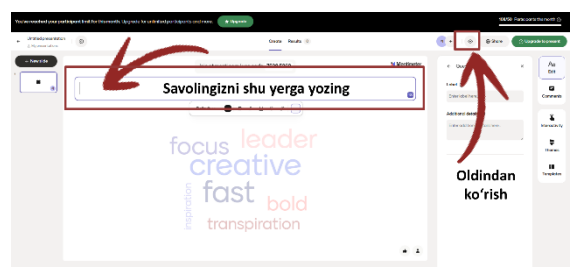


Fig. 3. Interface of the Mentimeter WordCloud slide illustrating the entry of an open-ended question to collect student responses during the introductory stage of the lesson

3. Results and discussion

Quantitative results

At the end of the intervention, both groups completed the same achievement test. The mean score of the experimental group was 4.5 (on a 5-point scale), while the control group obtained a mean score of 3.8. A t-test analysis indicated a statistically significant difference between the groups ($p < 0.05$). These findings suggest that the integration of Mentimeter WordCloud may have contributed to improved academic performance compared to traditional instruction.

Qualitative results

Survey results revealed that 92% of students in the experimental group perceived the lesson format as engaging and interactive, while 88% reported that the tool facilitated effective expression of their ideas. Interview responses further indicated that students found it easier to maintain attention during interactive lessons and reported better retention of key concepts compared to traditional classroom settings.

Table 1 presents a comparative overview of survey indicators between the experimental and control groups.

Table 1

Student Survey Results

Evaluation Indicator	Experimental Group (%)	Control Group (%)
The lesson was interesting	92	65
Opportunity to express own ideas	88	70
The topic was well understood	90	75
Active participation in class	85	60

Discussion

The findings of this study indicate that the structured integration of interactive digital tools can positively influence student engagement and learning outcomes. In particular, the visualization of collective responses through the WordCloud feature and the possibility of anonymous participation appeared to encourage broader student involvement, including those who might remain passive in traditional classroom environments.

From a cognitive perspective, organizing ideas through keyword-based visualization may support conceptual structuring and knowledge consolidation. The collective visual representation enabled students to compare their own understanding with that of their peers, thereby stimulating reflection and deeper processing of the material.

Compared to conventional lecture-based approaches, the interactive format was associated with higher levels of reported motivation and participation. However, the effective implementation of such technologies requires instructors to adopt facilitative roles, guiding discussion and interpreting real-time input within a structured pedagogical framework.

Several practical limitations should be considered, including the requirement for stable internet connectivity, additional preparation time, and potential information overload in large groups. Therefore, the pedagogical effectiveness of interactive visualization tools depends largely on thoughtful instructional design and teacher methodological competence.

Limitations and future research

This research was conducted within a single institution and over a limited time period. Future research may examine the effectiveness of WordCloud-based interaction across different disciplines, age groups, and cultural contexts. Further investigation into the integration of additional Mentimeter functionalities, such as ranking and quiz

formats, may provide deeper insight into the broader pedagogical potential of interactive digital platforms.

4. Conclusion

The findings of this research indicate that the Mentimeter WordCloud feature can serve as an effective interactive tool for organizing Uzbek language instruction in higher education. The integration of real-time visualization supported increased student engagement, facilitated conceptual understanding, and encouraged collaborative discussion.

The results provide empirical support for the pedagogical integration of interactive digital technologies in language education and offer practical guidance for their structured implementation in university classrooms. The use of WordCloud-based activities enables instructors to design more engaging, participatory, and outcome-oriented lessons.

Future research may expand this approach to other academic disciplines and explore the long-term impact of interactive digital tools on learning performance and student motivation.

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