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Title of research article

Designing Intelligent Electronic Questionnaires through Artificial Intelligence: Enhancing Respondent Motivation and User Experience in Academic Field Research

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Abstract

The integration of artificial intelligence (AI) into research methodologies represents a paradigm shift in how data are collected, analyzed, and interpreted. This study investigates the design and implementation of intelligent electronic questionnaires that utilize AI-based logic to enhance respondents' motivation and improve their participation experience in scientific field research. Recognizing the increasing digitalization of academic environments, the research argues that traditio... A sample of 55 university professors was surveyed using an electronic questionnaire designed in accordance with AI principles, incorporating adaptive sequencing, real-time feedback, simplified linguistic structures, and motivational micro-interactions. These elements were inspired by cognitive psychology, user experience (UX) design, and affective computing. Statistical analysis was conducted to assess how these design modifications affected respondents' engagement levels and completion rates. The results demonstrated that AI-enhanced questionnaires significantly improved user interaction, motivation, and data reliability. Respondents reported greater ease of use and a sense of intellectual engagement compared with conventional survey formats. The findings suggest that applying AI in questionnaire design not only transforms the tool into an interactive cognitive interface but also increases the scientific credibility of the resulting data by reducing respondent fatigue and random answering behavio... Ultimately, the study proposes a multidimensional framework for intelligent questionnaire design, combining sociological, psychological, and technological dimensions. It calls for universities and research institutions to integrate AI-driven methods in data collection to align academic research practices with the digital behavior of contemporary participants, thereby ensuring higher validity, richer data, and greater ethical accountability in the social sciences.

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Introduction and Problem Statement

The digital environment today is governed by users' sensory and visual experiences, which compels researchers, especially in social and educational sciences, to reconsider data collection tools in line with contemporary research technologies based on modern digital methods. The questionnaire, as a fundamental methodological tool, can no longer remain a static model composed of fixed questions; rather, it must evolve into an integrated interactive interface grounded in cognitive and technological principles, making answering a stimulating and enjoyable experience rather than a mental or mechanical burden.

In the digital age, respondents are expected to interact with questionnaires just as they do with smart applications or dynamic visual content on social media or entertainment platforms like interactive games, not merely respond to abstract, closed questions that address the intellect without engaging the senses and emotions. Consequently, many respondents answer questionnaires carelessly, often without fully reading the questions, leading to random and inaccurate answers that fail to reflect their true opinions — a phenomenon observed during our field experience in various university studies.

Moreover, the development of generative language models and predictive analysis algorithms has made it possible to design questionnaires that adapt to respondents' answers in real time, motivating them to continue and making them feel that their responses are valued. This transformation aligns with modern principles in educational psychology and user experience design (UX Design), which emphasize that personal and visual interaction enhances engagement and increases the likelihood of completion and accuracy (Fionillah Syahrozad & Subriadi, 2024).

The influence of artificial intelligence extends beyond aesthetic and motivational aspects to data quality and analysis improvement. Intelligent algorithms allow classification of response patterns, understanding of individual behaviors, and verification of internal consistency of answers, while also optimizing question flow, structure, and language accuracy. This opens broad prospects for researchers to obtain more in-depth and interpretable data, enhancing the validity and credibility of research results.

Despite these promising possibilities, academia remains slow to adopt such intelligent improvements. Many studies—particularly in social sciences—still rely on traditional tools such as Google Forms, MS Word, or PDF files, or even advanced software like SPSS without integrating AI capabilities or visual interactivity. This lag reflects not only a technical gap but also a pedagogical one, revealing insufficient understanding of the motivational and engagement variables required by new generations of respondents, particularly university students raised in digital environments.

From this perspective, an urgent need arises to explore the qualitative difference between traditional and AI-enhanced questionnaires regarding their impact on respondent motivation and participation experience. The central research question is thus:

To what extent does the development of electronic questionnaires using AI techniques enhance respondents' motivation and improve their participation experience?

Sub-questions:

1. Does using AI in developing electronic questionnaires increase respondents' motivation compared to traditional ones?

2. Does integrating AI tools into questionnaire design improve participation experience in terms of enjoyment and ease of answering?

Hypotheses:

1. The use of AI in developing electronic questionnaires contributes to increasing respondents' motivation compared to traditional questionnaires.

2. Integrating AI tools in designing electronic questionnaires improves the participation experience in terms of enjoyment and ease of response.

Research Importance:

The importance of this study lies in its focus on variables directly linked to current trends in using modern technology and AI in scientific research. It addresses the growing challenge researchers face with respondents' reluctance to participate or weak interaction with traditional questionnaires. The study aims to highlight the role of AI in improving the efficiency of electronic questionnaires by enhancing participant motivation and providing a more enjoyable and smooth experience, which positively affects the quality of the collected data.

Research Objectives:

1. To study the effect of AI on increasing respondents' motivation to participate in electronic questionnaires.

2. To analyze the impact of AI tools on improving the user experience while answering questions.

3. To compare traditional and AI-enhanced electronic questionnaires in terms of interactivity and attractiveness.

4. To propose effective mechanisms for developing AI-supported questionnaires in future research.

Definition of Terms:

- **Artificial Intelligence (AI):** A set of systems and software capable of simulating human intelligence through tasks such as learning, analysis, and decision-making without direct human intervention (Russell & Norvig, 2022).

- **Electronic Questionnaires:** Digital tools used for data collection online through email or mobile applications, characterized by ease of use, rapid analysis, and high levels of customization and interaction (Tanner, 2018; Dawson, 2019).

- **Motivation:** The internal and external forces that drive individuals to engage in behavior aimed at achieving specific goals (Trautnerand & Pinquart, 2025; Bandhu et al., 2024).

- **Field Research:** Studies conducted in the natural environment of respondents, collecting data directly through observation, questionnaires, or interviews (Burgess, 1991; Ubaydat et al., 2004).

Previous Studies:

- **Study 1:** *Tell Me About Yourself: Using an AI-Powered Chatbot to Conduct Conversational Surveys with Open-Ended Questions* — This study tested the effectiveness of AI chatbots in conducting interactive surveys compared to traditional ones and found higher engagement and more detailed responses.

- **Study 2:** *AI-Assisted Conversational Interviewing: Effects on Data Quality and User Experience* — Examined the use of conversational AI agents and found improved data quality and user comfort, though interactions took longer.

- **Study 3:** *Submitting Surveys via a Conversational Interface: An Evaluation of User Acceptance and Approach Effectiveness* — Found that participants using conversational interfaces were more motivated and provided higher response rates and enjoyment.

Methodology:
The study used the **descriptive-analytical method**, suitable for describing and analyzing university professors' views on the use of AI in developing electronic questionnaires and its impact on their motivation and experience.

Study Population and Sample:

The population consisted of university professors at Algerian higher education institutions. The sample included **55 professors**—45 from *Mohamed Lamine Debaghine University (Setif 2)* and 10 from *École Normale Supérieure of Laghouat*—selected purposefully due to their expertise and familiarity with research tools.

Study Domains:

- **Spatial Domain:** Mohamed Lamine Debaghine University (Setif 2) and ENS Laghouat.

- **Temporal Domain:** Conducted during the second semester of the 2025–2026 academic year (May–June 2025).

- **Human Domain:** 55 university professors with direct relevance to the study's subject.

Data Collection Tools:

- An **electronic questionnaire** integrating AI-based design elements (logical flow, adaptive questioning, interactive language).

- **Semi-structured interviews** with selected professors.

- **Non-participatory observation** to record respondents' interaction behavior.

Instrument Validity and Reliability:

- **Content Validity:** Assessed by five expert reviewers in education technology, assessment, and AI in education, leading to linguistic and structural improvements.

- **Reliability (Cronbach's Alpha):** The total reliability coefficient was **0.913**, indicating high internal consistency.

- **Construct Validity:** Calculated as $\sqrt{0.913} =$ **0.955**, confirming strong statistical validity and instrument appropriateness.

Results Presentation, Interpretation, and Discussion:

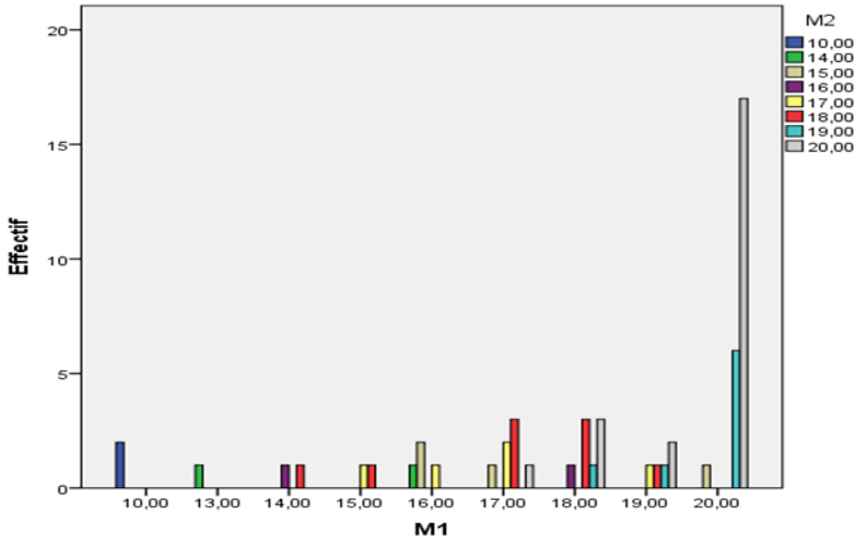
First Hypothesis:

Table (2): Statistical Operations

Statements	Answers	%	Answers	%	Calculated χ^2	Tabulated χ^2	df	Significance Level
01	Yes	85.5	No	14.5	27.655	3.841	01	0.05
02	Yes	87.3	No	12.7	30.564	3.841	01	0.05
03	Yes	89.1	No	10.9	33.618	3.841	01	0.05
04	Yes	85.5	No	14.5	27.655	3.841	01	0.05
05	Yes	63.6	No	36.4	4.091	3.841	01	0.05

Statements	Answers	%	Answers	%	Calculated χ^2	Tabulated χ^2	df	Significance Level
06	Yes	76.4	No	23.6	15.291	3.841	01	0.05
07	Yes	81.8	No	18.2	22.273	3.841	01	0.05
08	Yes	74.5	No	25.5	13.255	3.841	01	0.05
09	Yes	85.5	No	14.5	27.655	3.841	01	0.05
10	Yes	76.4	No	23.6	15.291	3.841	01	0.05

Source: Based on the outputs of the Statistical Package for the Social Sciences (SPSS)



Statement 01:

"Do the illustrative images or videos within the questionnaire motivate you to participate?" "Yes" responses: 85.5%

$\chi^2 = 27.655 > 3.841$

Result: The difference is statistically significant, indicating that images and videos are motivating factors for participation in the questionnaire.

Statement 02:

"Do you believe that the presence of interactive representations (such as a short video explaining the question) increases your willingness to complete the questionnaire?" "Yes": 87.3%

$\chi^2 = 30.564 > 3.841$

Result: Interactive elements such as videos increase engagement and encourage completion of the questionnaire.

Statement 03:

"Do logical progressions of questions, especially with images or illustrative graphics, make it easier for you to respond?"

"Yes": 89.1%

$\chi^2 = 33.618$

Result: The presence of images or graphics facilitates understanding and improves the logical flow of the questionnaire.

Statement 04:

"Do you feel that interactive language supported by visual elements makes the questionnaire more engaging?"

"Yes": 85.5%

$\chi^2 = 27.655$

Result: Visual elements enhance participant motivation and increase willingness to continue answering.

Statement 05:

"Do you think that an AI-designed questionnaire with multimedia support keeps your attention longer?"
"Yes": 63.6%

$\chi^2 = 4.091 \approx 3.841$

Result: The differences are statistically significant but weak, indicating that attention retention varies among participants, though there is a general positive tendency.

Statement 06:

"Do you believe these elements (images/videos/illustrations) make your answers more accurate and meaningful?"

"Yes": 76.4%

$\chi^2 = 15.291$

Result: These elements contribute to improving answer quality in terms of accuracy and clarity.

Statement 07:

"Do you feel that using multimedia reduces boredom during participation?"
"Yes": 81.8%

$\chi^2 = 22.273$

Result: Multimedia reduces boredom and makes interaction with questions more engaging.

Statement 08:

"Do you prefer participating in surveys that include interactive and multimedia elements compared to traditional surveys?"

"Yes": 74.5%

$\chi^2 = 13.255$

Result: Most participants prefer interactive formats compared to traditional or paper-based questionnaires.

Statement 09:

"Do you find that an AI-supported questionnaire with visual elements is more attractive?"
"Yes": 85.5%

$\chi^2 = 27.655$

Result: AI and visual elements add an appealing dimension that enhances participant engagement.

Statement 10:

"Do you think that this type of questionnaire helps researchers obtain better and more interactive data?"

"Yes": 76.4%

$\chi^2 = 15.291$

Result: Participants believe that this type of questionnaire produces more realistic and interactive data than traditional models.

Interpretation of the Results:

Based on the results obtained, it can be said that the use of artificial intelligence in designing and presenting interactive questionnaires clearly contributed to enhancing participant motivation. Their responses show a strong tendency to prefer models supported by multimedia such as images, videos, and illustrations, which add a visual and interactive dimension that makes the research tool more appealing and facilitates deeper and more comfortable understanding of the questions.

This positive trend aligns with previous studies. The study by **Xiao et al. (2019)** on the use of an AI-powered chatbot showed that participants provided longer and more detailed responses and felt greater engagement due to the conversational and stimulating nature of the interaction. Similarly, **Celino and Calegari (2020)** found that presenting questionnaires through interactive interfaces increased response rates and made the user experience more enjoyable, reflecting AI's role in encouraging participation.

Moreover, **Barari et al. (2025)** indicated that AI tools not only increase motivation but also improve data quality, as participants felt more comfortable and their answers were more precise and organized, thanks to the ease of interaction and clarity of presentation.

Based on this, the current findings demonstrate that the shift toward AI-based research tools is no longer just a technical enhancement but a necessary step to stimulate participation and ensure positive engagement — directly enhancing the quality and credibility of research data.

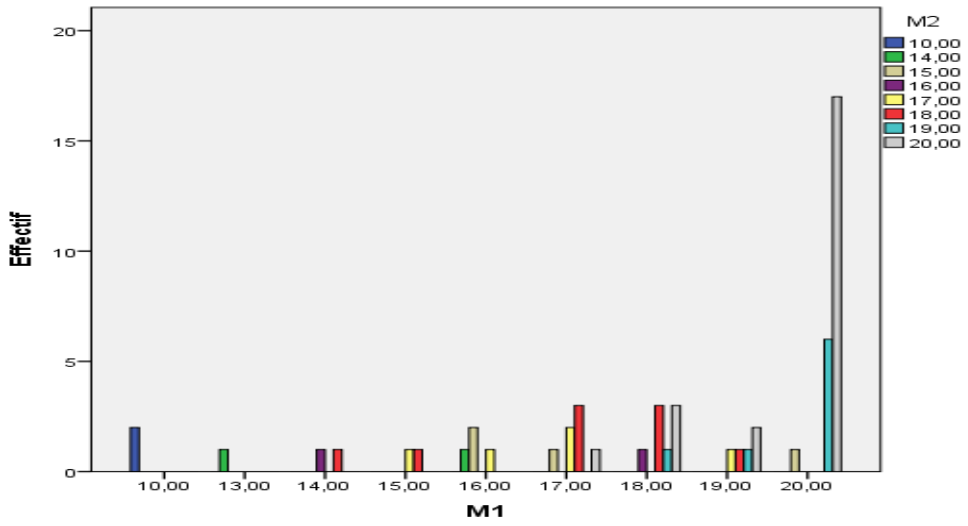
Second Hypothesis:

Table (2): Statistical Operations

Statements	Answers	%	Answers	%	Calculated χ^2	Tabulated χ^2	df	Significance Level
01	Yes	94.5	No	5.5	43.655	3.841	01	0.05
02	Yes	81.8	No	18.2	22.273	3.841	01	0.05

Statements	Answers	%	Answers	%	Calculated χ^2	Tabulated χ^2	df	Significance Level
03	Yes	81.8	No	18.2	22.273	3.841	01	0.05
04	Yes	78.2	No	21.8	17.473	3.841	01	0.05
05	Yes	67.3	No	32.7	6.564	3.841	01	0.05
06	Yes	70.9	No	29.1	9.618	3.841	01	0.05
07	Yes	96.4	No	3.6	47.291	3.841	01	0.05
08	Yes	85.5	No	14.5	27.655	3.841	01	0.05
09	Yes	81.8	No	18.2	22.273	3.841	01	0.05
10	Yes	78.2	No	21.8	17.473	3.841	01	0.05

Source: Based on the outputs of the Statistical Package for the Social Sciences (SPSS)



Statement 01:
"Do you expect that questionnaires containing images and videos are more enjoyable during participation?"
"Yes" = 94.5%

χ^2 = 43.655

Result: A statistically significant difference, indicating that images and videos make the questionnaire more enjoyable.

Statement 02:

"Do you believe that multimedia makes answering the questions easier and clearer?"
"Yes" = 81.8%

χ^2 = 22.273

Result: Participants find that multimedia helps facilitate responses and increases clarity.

Statement 03:

"Is navigating between questions smoother with interactive media support?"
"Yes" = 81.8%

$\chi^2 = 22.273$

Result: Navigation between questions is easier when interactive media is used.

Statement 04:

"Does interactive language combined with multimedia make the questionnaire more enjoyable?"
"Yes" = 78.2%

$\chi^2 = 17.473$

Result: Interactive language and media add an element of enjoyment for the participant.

Statement 05:

"Do you think that questionnaires containing explanatory videos reduce fatigue during answering?"
"Yes" = 67.3%

$\chi^2 = 6.564$

Result: The difference is significant, meaning that videos indeed help reduce the feeling of fatigue.

Statement 06:

"Do you consider these questionnaires easier than traditional ones?"
"Yes" = 70.9%

$\chi^2 = 9.618$

Result: Most participants believe that media-supported questionnaires are easier than traditional ones.

Statement 07:

"Do you think that the presence of interactive elements makes the questionnaire livelier and more engaging?"

"Yes" = 96.4%

$\chi^2 = 47.291$

Result: A large and highly significant difference, indicating that interactive elements add great liveliness to the questionnaire.

Statement 08:

"Are questions supported by multimedia clearer and easier to understand?"
"Yes" = 85.5%

$\chi^2 = 27.655$

Result: Multimedia makes questions clearer and easier to understand.

Statement 09:"Do these questionnaires encourage you to complete your responses to the end?" "Yes" = 81.8%

$\chi^2 = 22.273$

Result: Participants are more willing to complete interactive questionnaires to the end.

Statement 10:

"Do AI questionnaires supported with images and videos make participation less exhausting?" "Yes" = 78.2%

$\chi^2 = 17.473$

Result: This type of questionnaire reduces the feeling of fatigue during participation

Interpretation of Results:

Based on the results obtained in this study, it can be confirmed that the integration of artificial intelligence tools in designing electronic questionnaires has effectively contributed to improving participants' experience, both in terms of enjoyment and ease of response. Participants expressed their preference for questionnaires that include multimedia elements such as images, videos, and visual representations, as they add vitality and interactivity to the content of the questions, making the experience smoother and clearer.

This positive trend is entirely consistent with previous studies. The study by **Xiao et al. (2019)** showed that questionnaires supported by intelligent chatbots made the user experience more engaging and less boring, which helped improve their interaction and increase the quality of responses, reflecting their awareness of enjoyment and ease during answering.

The study by **Barari et al. (2025)** also revealed that the use of intelligent conversational tools provided participants with a sense of comfort during interaction, helping them organize their thoughts and facilitate responses, confirming the role of these tools in improving the overall user experience.

Similarly, **Celino and Calegari (2020)** demonstrated that presenting questionnaires through interactive interfaces greatly improved user acceptance and increased engagement, as participants felt that such questionnaires were clearer and easier than traditional methods—particularly due to the interactive structure that enables smooth navigation between questions and reduces cognitive effort.

From all the above, it can be concluded that the improvement in participation experience is not limited to a technical or formal aspect only, but extends to the psychological and emotional dimension of the participant through a more engaging and comfortable interactive environment. This enhances the quality of the collected data and contributes to the overall success of the research process.

Conclusion:

In light of the quantitative and analytical results obtained in this study, it can be confirmed that the integration of artificial intelligence technologies in the design of electronic questionnaires represents a qualitative leap in scientific research—particularly in the social and human sciences—since these fields rely heavily on various research tools for data collection and analysis. Questionnaires, as a fundamental tool in these types of research, are particularly suitable for studying social and human phenomena where experimental methods are often inapplicable.

The data obtained showed that interactive models supported by multimedia elements (such as images, videos, and visual aids) not only increase participants' motivation and willingness to answer the questionnaire items but also improve the response experience in terms of clarity, enjoyment, and flow.

Comparing these results with previous studies further strengthens the credibility of the shift toward intelligent questionnaires. Research evidence indicates that artificial intelligence can adapt presentation, facilitate interaction,

and achieve a higher level of participant engagement. Therefore, this type of tool is no longer merely a technical advancement but a necessity for improving data quality and enhancing the effectiveness of the research process.

Recommendations:

This study concluded with several recommendations deemed essential to support this topic, the most important of which are:

- Encourage researchers in the social and human sciences to adopt and apply AI-supported questionnaires, especially in studies requiring high interaction or targeting multi-level audiences.

- Integrate multiple illustrative media elements (such as images, diagrams, figures, and short videos) into questionnaire design due to their direct effect on improving comprehension, capturing attention, and reducing mental distraction.

- Rely on intelligent interactive interfaces (such as chatbots or innovative dialog systems) to present questionnaires in a human-like manner, enhancing participants' comfort and motivation.

- Form multidisciplinary research teams including specialists in artificial intelligence and visual design alongside researchers in the social and human sciences, to produce precise and effective interactive tools—especially since the Ministry of Higher Education and Scientific Research in Algeria is moving toward promoting the use of technology, particularly AI, to increase the scientific publication rate of Algerian researchers.

- Reconsider traditional data collection models in academic institutions and encourage investment in developing intelligent digital platforms that facilitate the preparation of modern and effective tools. In this context, entrepreneurial or startup projects can be used to enhance the skills of teachers and students in this field.

- Conduct future comparative studies among various types of interactive questionnaires to determine the most effective models depending on the sample and research topic, aiming to reach standardized models for each research theme, field, or discipline.

Ethical Considerations

The research adhered to institutional ethical guidelines established by Setif2 University and the University of Tizi Ouzou. All participants provided informed consent before participation. The study did not involve any form of deception, invasive procedures, or data that could identify individuals. Data confidentiality was maintained throughout, and participation was voluntary. The design and execution of the research complied with the ethical principles of integrity, transparency, and resp...

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Conflict of Interest

The authors declare no conflict of interest related to the design, implementation, analysis, or publication of this study. All authors have approved the final manuscript and agree with its submission.

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