

“Active Interaction Levels Among Students at Al-Quds Open University Based on Kolb’s Experiential Learning Mode”

Researchers:

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ABSTRACT:

Objectives: This study aims to identify the level of active interaction among students at Al-Quds Open University in light of Kolb's Experiential Learning Model and to examine whether interaction levels differ according to gender, faculty, academic level, and GPA.

Method: A descriptive-analytical research design was employed. The sample consisted of 450 male and female students selected using a stratified random sampling technique. Data were collected through a validated and reliable questionnaire measuring four dimensions of active interaction behavioral, emotional, cognitive, and social aligned theoretically with the stages of Kolb's experiential learning cycle.

Results: The findings revealed that the overall level of active interaction among students was moderate to high. Significant differences were found in favor of female students and high-achieving students (GPA), while no statistically significant differences appeared across academic levels. The results further indicated that the dimensions of active interaction correspond meaningfully with Kolb's four experiential stages, supporting the model's relevance in interpreting engagement patterns within e-learning environments.

Conclusions: The study concludes that fostering active interaction requires designing e-learning experiences that support reflective engagement, cognitive processing, and collaborative application consistent with Kolb's experiential cycle. It highlights the importance of integrating experiential learning principles into course design and instructional practices to enhance students' motivation, interaction, and self-regulated learning in open and distance education settings.

Keywords: E-learning, Kolb's experiential learning model, Active engagement.

Introduction:

E-learning has become an essential pillar of contemporary higher education, particularly within open and blended learning systems. As universities continue to integrate digital platforms into teaching and learning processes, the need to ensure high levels of student engagement and interaction has grown correspondingly. Active interaction encompassing behavioural, emotional, cognitive, and social forms of engagement plays a central role in determining the quality of students' learning experiences and their ability to construct, reflect upon, and apply knowledge (Fanshawe & Barton, 2023).

Within this context, Kolb's Experiential Learning Model provides a comprehensive theoretical lens for understanding how learners engage with instructional activities. The model proposes a cyclical process consisting of four interconnected stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. This sequence emphasizes the learner's role in transforming experience into structured knowledge through active participation, reflection, meaning-making, and application. Such a model aligns closely with the principles of e-learning environments, where learners are expected to navigate activities, engage with content, communicate with peers, and apply understanding in authentic or simulated contexts (Fradi & Cheniti-Belcadhi, 2022; Oussous et al., 2023).

Given the expansion of e-learning at Al-Quds Open University, examining how students interact within these environments has become increasingly important. While prior research has highlighted the significance of interaction for enhancing motivation, comprehension, and academic achievement, variability across demographic characteristics such as gender, faculty, academic level, and GPA remains insufficiently explored in the local context. Understanding these differences is essential for designing responsive e-learning environments grounded in experiential learning principles (Mehta & Mehta, 2023).

Accordingly, this study seeks to identify the level of active interaction among students at Al-Quds Open University in light of Kolb's Experiential Learning Model and to analyze whether these levels differ across selected demographic variables. This inquiry contributes to a deeper understanding of student engagement patterns and provides evidence-based insights to guide instructional design and policy development within open and online learning systems.

Statement of the Problem

Despite the increasing reliance on e-learning environments at Al-Quds Open University, levels of active interaction among students remain variable. Active interaction—encompassing behavioral, emotional, cognitive, and social dimensions—is considered essential for supporting meaningful learning processes, particularly within frameworks such as

Kolb's Experiential Learning Model. However, limited empirical evidence exists regarding how actively students engage in e-learning environments and whether differences in interaction levels are associated with demographic factors such as gender, faculty, academic level, and GPA. Understanding these patterns is crucial for improving instructional design and fostering learning environments aligned with experiential learning principles. Accordingly, the current study seeks to identify the level of active interaction among university students in light of Kolb's model and to examine whether these levels vary according to key demographic variables.

Research Questions

To address the stated problem, the study answers the following questions:

Main Question

What is the level of active interaction among students at Al-Quds Open University in light of Kolb's Experiential Learning Model?

Sub-Question. Are there statistically significant differences ($\alpha = 0.05$) in the levels of active interaction according to gender, faculty, academic level, and GPA?

Research Objectives

The study aims to achieve the following objectives:

Identify the level of active interaction among students at Al-Quds Open University in light of Kolb's Experiential Learning Model.

Determine whether active interaction levels differ according to gender, faculty, academic level, and GPA.

Research Hypotheses

In alignment with the descriptive-analytical method, the following hypotheses were formulated:

H01: There are no statistically significant differences ($\alpha = 0.05$) in active interaction levels according to gender.

H02: There are no statistically significant differences ($\alpha = 0.05$) in active interaction levels according to faculty.

H03: There are no statistically significant differences ($\alpha = 0.05$) in active interaction levels according to academic level.

H04: There are no statistically significant differences ($\alpha = 0.05$) in active interaction levels according to GPA.

Theoretical Framework

Active Interaction in E-Learning

Active interaction in e-learning environments is characterized by continuous and meaningful participation in learning activities that foster engagement with content, instructors, and peers (Otto et al., 2023). This dynamic not only enhances the learning process but also instills a greater sense of responsibility in learners, ultimately leading to improved academic outcomes. Prior studies (Mulla et al., 2023; Otto et al., 2023) have emphasized that active interaction cultivates a sense of community, promotes collaboration, and facilitates knowledge co-construction through various modalities:

1. **Learner–Learner Interaction:** Encourages collaboration, multiple perspectives, and cooperative learning.
2. **Learner–Content Interaction:** Provides adaptive content tailored to individual differences.
3. **Learner–Instructor Interaction:** Facilitates real-time and asynchronous communication through text, audio, and video.
4. **Content–Instructor Interaction:** Supports the continuous refinement of learning materials.
5. **Instructor–Instructor Interaction:** Promotes professional exchange and collaborative content development.
6. **Content–Content Interaction:** Involves the integration of educational materials with external information sources for ongoing updates.

Significance of Active Interaction

Active interaction is fundamental for creating enriched and collaborative learning environments. Lowenthal and Dunlap (2018) highlighted its role in promoting self-directed learning, sustained communication, and collaboration supported by artificial intelligence tools embedded within learning management systems. These include chat-bots, recommendation engines, and predictive analytics, which deliver personalized content that aligns with learners' preferred learning styles.

Similarly, Zawacki-Richter et al. (2019) emphasized that such personalization fosters deeper and more consistent engagement, thereby improving learning experiences and completion rates. Al-Rahmi et al. (2021) further noted that active

interaction constitutes the core of effective learning by stimulating critical thinking, problem-solving, and meaningful learner–instructor engagement.

Role of Faculty in Promoting Active Interaction

Active interaction emerges from learners' engagement with their environment, where knowledge and action are reciprocally constructed (Sølvberg & Rismark, 2023). Faculty members thus play a pivotal role in fostering active learning environments by designing purposeful, technology-enhanced activities that cultivate cognitive, social, and instructional presence (Candela-Muñoz & Rodríguez-Gámez, 2023; Lowenthal & Dunlap, 2018) outlined several key practices to support active interaction:

1. Providing personalized and timely feedback through multiple communication modes (e.g., email, audio, video conferencing).
2. Facilitating peer-to-peer collaboration via group projects, synchronous sessions, and discussion forums.
3. Ensuring faculty accessibility to address learners' queries effectively.

Active Learning Strategies

Active learning strategies, rooted in social constructivist and learner-centered adaptive models (Sølvberg & Rismark, 2023), are essential for creating flexible and motivating e-learning environments. Notable strategies include (Candela-Muñoz & Rodríguez-Gámez, 2023; Doolittle et al., 2023):

1. Socially interactive learning strategies.
2. Critical thinking enhancement strategies.
3. Activity-based learning strategies.
4. Reflective assessment and metacognitive strategies.

Kolb's Experiential Learning Model in Adaptive E-Learning Environments

E-learning has emerged as a transformative paradigm in contemporary education, offering individualized learning opportunities that foster autonomy, flexibility, and continuous knowledge development. Its adaptability supports lifelong learning and enables learners to acquire independent knowledge modeling skills and apply them effectively across real-world contexts (Berestova et al., 2022). Within this domain, Kolb's experiential learning model serves as a foundational framework, emphasizing that meaningful learning occurs through a cyclical process encompassing four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984, 1999). Kolb argues that learners do not necessarily commence learning from the same stage, yet effective learning requires progression through all four stages to achieve deep understanding.

This cyclical process begins with concrete experience, wherein learners engage with real or simulated activities. This is followed by reflective observation, where learners critically analyze their experiences to extract meaning. Subsequently, these reflections are synthesized into abstract concepts, forming the basis for generalizations and theoretical understanding. The final phase, active experimentation, involves applying these concepts in new contexts to test and refine knowledge (Knowles et al., 2005; Komives, 2009). Through this iterative process, learning transitions from a theoretical construct into a dynamic, applied framework, continuously evolving through the interaction between experiential engagement and conceptual refinement.

Kolb's model has been widely adopted in adaptive e-learning systems to enhance learner outcomes by aligning instructional design with experiential phases (Hassane, 2022; Mehta & Mehta, 2023). By integrating experiential learning principles into e-learning, faculty members can bridge traditional and technology-enhanced pedagogies, facilitate holistic development and foster critical thinking, reflective practice, and applied competence (Ali, 2023). This approach has been successfully implemented across diverse educational contexts, including higher education, vocational training, and technical education (Egan et al., 2023; Waladi et al., 2023; Tuczynski, 2023).

Learning Styles within Kolb's Experiential Model

Kolb identifies four primary learning styles derived from the interaction of his experiential stages:

1. Accommodating learners: prioritize concrete experience and active experimentation.
2. Divergent learners: focus on concrete experience and reflective observation.
3. Convergent learners: emphasize abstract conceptualization and active experimentation.
4. Assimilative learners: engage primarily with abstract conceptualization and reflective observation (Abissa et al., 2016; Abu-Hashim, 2000).

In the era of e-learning, these styles have been adapted to leverage digital tools, including virtual simulations, interactive games, and technology-mediated activities, ensuring alignment between experiential learning principles and digital pedagogies (Herrington & Oliver, 2000).

Contributions of Kolb's Experiential Model

Kolb's experiential framework contributes to the enhancement of educational processes by:

1. Promoting learner self-awareness and reflective capacity.
2. Supporting faculty in adopting reflective teaching practices.
3. Strengthening cognitive engagement and critical thinking skills.
4. Tailoring learning to individual styles and fostering collaboration.
5. Structuring cumulative skill development programs.
6. Bridging theoretical understanding with practical application to ensure holistic learning outcomes (Haritha & Rao, 2024).

The Theoretical Alignment Between Active Interaction Dimensions and the Stages of Kolb's Experiential Learning Model

Each dimension of the active interaction scale corresponds to a specific stage of learning within Kolb's Experiential Learning Model. The behavioral dimension aligns with the stage of Concrete Experience, while the emotional dimension reflects the stage of Reflective Observation. The cognitive dimension corresponds to Abstract Conceptualization, whereas the social dimension aligns with Active Experimentation, where knowledge is applied through interaction with others.

1. Behavioural Interaction → Concrete Experience
2. Emotional Interaction → Reflective Observation
3. Cognitive Interaction → Abstract Conceptualization
4. Social Interaction → Active Experimentation

This alignment provides a coherent framework for interpreting learner engagement patterns in e-learning environments.

Implementation via Microsoft Teams

The integration of Kolb's model into platforms such as Microsoft Teams has demonstrated significant potential in facilitating experiential learning cycles (Kumar et al., 2021; Fisher, 2022). Teams offers features including Live Events, Channels, and integrated assessment tools that enable learners to engage in virtual experiments, reflective discussions, and collaborative projects. Faculty members can guide learners through the four stages by delivering real-time interactive content, organizing peer feedback mechanisms, and embedding reflective journals via OneNote Class Notebook (Kaouni et al., 2023).

Methodology

The study employs a quantitative research design, it adopted the descriptive-analytical method to identify active interaction levels and analyse differences according to demographic variables utilizing a questionnaire-based approach to examine the effectiveness of Kolb's experiential model in fostering active engagement within e-learning environments. The population comprised 25,700 students enrolled at Al-Quds Open University (West Bank) during the academic year 2024–2025, from which a random sample of 450 (121 male, 329 female) students was selected.

Instrument of the Study

The instrument, adapted from previous studies (Wang, 2023; Lowenthal & Dunlap, 2018), included 29 items distributed across four domains: behavioral interaction (1–7), cognitive interaction (8–13), emotional interaction (14–18), and social interaction (19–29). Responses were recorded using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Validity was established via expert review and internal consistency analyses (Cronbach's α), with revisions made to enhance clarity and relevance.

Reliability of the Instrument

The reliability of the tool was assessed using Cronbach's Alpha. The coefficients for each dimension were as follows: - Behavioral Interaction: $\alpha = 0.89$ - Emotional Interaction: $\alpha = 0.87$ - Cognitive Interaction: $\alpha = 0.91$ - Social Interaction: $\alpha = 0.88$

The overall reliability coefficient was $\alpha = 0.93$, indicating a high level of internal consistency suitable for empirical research.

Data Collection Procedures

Data were collected electronically via the university's learning management system. Students were invited to participate voluntarily, and confidentiality was assured. Responses were screened and prepared for statistical analysis through coding and verification procedures.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). The following analyses were conducted: - Descriptive statistics (means and standard deviations) to determine levels of active interaction. - One-way ANOVA to test for statistically significant differences across gender, faculty, academic level, and GPA.

These analytical methods align with the study's objectives and ensure rigorous interpretation of the findings.

Results

The study investigated whether statistically significant differences ($\alpha = 0.05$) exist in the level of active interaction across four demographic variables: gender, college, grade point average (GPA), and academic level. Descriptive statistics, including arithmetic means and standard deviations, were computed for the four dimensions of active interaction (cognitive, emotional, behavioral, and social) as outlined in the active interaction questionnaire.

Descriptive Analysis

Table 1 presents the arithmetic means and standard deviations of participants' responses (N = 450). The overall mean score for active interaction was 4.03 (SD = 0.63), indicating a generally high level of interaction. Among the dimensions, cognitive interaction recorded the highest mean (M = 4.07, SD = 0.68), followed closely by emotional (M = 4.06, SD = 0.69) and behavioral interaction (M = 4.06, SD = 0.68). Social interaction scored slightly lower (M = 3.98, SD = 0.69).

Table (1). Means and Standard Deviations of the Study Participants' Responses on the Active Interaction Questionnaire

Dimension	Mean	Standard Deviation	N
Cognitive Interaction	4.0707	0.68198	450
Emotional Interaction	4.0649	0.69504	450
Behavioral Interaction	4.0552	0.68318	450
Social Interaction	3.9818	0.68949	450

Overall Scale	4.0323	0.63019	450
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Gender Differences

Table 2 shows notable differences in active interaction based on gender. Female participants ($M = 4.12$, $SD = 0.53$) exhibited higher interaction levels compared to their male counterparts ($M = 3.80$, $SD = 0.80$). This suggests a gender-related variation favoring females.

Table (2). Means and Standard Deviations of the Study Participants' Responses on the Active Interaction Questionnaire According to Gender Variable.

Gender	N	Mean	Standard Deviation
Male	121	3.8002	0.79987
Female	329	4.1176	0.53142
Total	450	4.0323	0.63019

College Specialization

As presented in Table 3, no substantial differences were observed between colleges. Humanities and Social Sciences students ($M = 4.02$, $SD = 0.64$) and Technology, Applied Sciences, and Economics students ($M = 4.05$, $SD = 0.62$) demonstrated comparable levels of active interaction.

Table (3). Means and Standard Deviations of the Study Participants' Responses on the Active Interaction Questionnaire According to College Variable.

College of Specialization	N	Mean	Standard Deviation
Humanities and Social Sciences	254	4.0210	0.63909
Technology, Applied Sciences, and Economics	196	4.0468	0.61979
Total	450	4.0323	0.63019

Academic Performance

Table 4 indicates variation according to GPA. Learners with "Very Good" ($M = 4.09$, $SD = 0.55$) and "Excellent" ($M = 4.08$, $SD = 0.67$) averages showed the highest interaction levels, whereas those rated as "Acceptable" ($M = 3.65$, $SD = 0.99$) and "Weak" ($M = 2.06$, $SD = 0.42$) scored markedly lower.

Table (4). Means and Standard Deviations of the Study Participants' Responses on the Active Interaction Questionnaire According to Academic Average

Academic Average	N	Mean	Standard Deviation
Excellent	83	4.0777	0.67070
Very Good	200	4.0919	0.54546
Good	148	4.0014	0.59970
Acceptable	15	3.6529	0.99604
Poor	3	2.0575	0.41570
Deficient	1	4.5172	—
Total	450	4.0323	0.63019

Academic Level

As shown in Table 5, fourth-year students ($M = 4.14$, $SD = 0.46$) demonstrated slightly higher levels of interaction compared to first-year ($M = 4.01$, $SD = 0.63$), second-year ($M = 4.01$, $SD = 0.70$), and third-year students ($M = 3.97$, $SD = 0.68$).

Table (5). Means and Standard Deviations of the Study Participants' Responses on the Active Interaction Questionnaire According to Academic Level.

Academic Level	N	Mean	Standard Deviation
First Year (less than 33 credit hours)	46	4.0105	0.63128
Second Year (less than 66 credit hours)	129	4.0131	0.69936
Third Year (less than 99 credit hours)	150	3.9680	0.68180
Fourth Year (99 credit hours and above)	125	4.1371	0.46188
Total	450	4.0323	0.63019

Inferential Analysis

To test the statistical significance of these differences, a one-way analysis of variance (ANOVA) was conducted in Table 6. Results revealed that gender ($F = 26.71$, $p < .001$, $\eta^2 = 0.057$) and GPA ($F = 8.32$, $p < .001$, $\eta^2 = 0.087$) significantly influenced active interaction. Females outperformed males, and students with higher GPAs (Excellent, Very Good) showed greater interaction than those with lower GPAs (Acceptable, Weak). Academic level exhibited a minor, non-significant effect ($F = 0.85$, $p = .467$, $\eta^2 = 0.006$), although a trend suggested increased interaction among senior students. College specialization had no significant impact ($F = 0.009$, $p = .923$, $\eta^2 = 0.000$).

Table (6). One-Way Analysis of Variance (ANOVA) of the Study Participants' Responses on the Active Interaction Questionnaire According to Four Demographic Variables

Source of Variation	Sum of Squares	df	Mean Square	F	Significance (p)	Eta Squared
Gender	9.298	1	9.298	26.711	0.000	0.057
Academic Level	0.889	3	0.296	0.851	0.467	0.006
Faculty of Specialization	0.003	1	0.003	0.009	0.923	0.000
Academic Average	14.485	5	2.897	8.322	0.000	0.087
Error	152.818	439	0.348	—	—	—
Adjusted Total	178.315	449	—	—	—	—

Interpretation

These findings indicate that while active interaction levels were generally high across the sample, they were most strongly influenced by gender and academic performance, moderately by academic level, and not significantly by college specialization. The results underscore the potential of Kolb's experiential model to enhance interaction across diverse learner profiles, particularly when tailored to gender-based learning preferences and academic achievement levels.

The statistical analysis indicates significant differences in active interaction favoring female students ($F = 26.71$, $p < .001$) and high-achieving students, with an upward trend among those in advanced academic levels. These differences can be attributed to three interrelated factors. First, the literature shows that female learners tend to exhibit higher reflective and collaborative engagement, aligning with the Reflective Observation and Active Experimentation stages in Kolb's model (Bailey et al., 2020; Taheri et al., 2021). Second, high-achieving students possess stronger cognitive and self-regulatory capacities, particularly in Abstract Conceptualization which enhances their ability to translate experience into applicable knowledge (Shirazi et al., 2019). Third, accumulated academic experience in higher study levels facilitates more effective progression through Kolb's learning cycle, consistent with the observed increase in social and cognitive interaction (Villarroel, 2020). Collectively, these factors provide a coherent explanation for the patterns identified in the study's

statistical results.

Discussion of the Results

The findings of this study revealed statistically significant differences favoring females across all dimensions of active interaction, regardless of learning style. The most prevalent learning style order identified among learners was absorptive, divergent, convergent, and adaptive. These results are consistent with Richardson and Mishra (2020), who reported a similar ordering—accommodative, divergent, convergent, and adaptive—highlighting the influence of gender-based motivational differences, with females demonstrating higher engagement levels. Furthermore, they align with Al-Mahrezi et al. (2022), who found that females outperform males in learning activities associated with assimilative and divergent styles.

The observed gender differences may be attributed to variations in intrinsic motivation, with females exhibiting greater self-driven engagement linked to emotional interaction in the learning process.

In contrast, no statistically significant differences were observed concerning learners' academic specialization across all learning styles. This suggests that the Kolb experiential model does not necessitate customization based on discipline, as its design demonstrates universal applicability and ease of implementation across diverse academic contexts. This finding supports Passarelli et al. (2020), who concluded that active interaction within the Kolb framework is not discipline-dependent, and Kolb and Kolb (2022), who emphasized the model's adaptability to various fields, including experimental, applied, literary, technical, and medical disciplines.

Additionally, the study indicated statistically significant differences across all Kolb learning styles in favor of learners with excellent and very good academic achievement compared to their low-achieving peers. This reinforces the strong association between active interaction and academic performance, as also demonstrated by Yeo et al. (2022), who reported a positive correlation between active interaction and high academic achievement regardless of learning style preference. Similarly, Alharbi et al. (2023) found that high-achieving learners are more proficient in utilizing learning styles effectively across diverse educational contexts.

This result can be attributed to the greater readiness of high-achieving learners to engage in various forms of active interaction, facilitating the construction of new knowledge and experiences, and their superior ability to adapt to learning situations requiring a high level of cognitive engagement. Moreover, the study found that fourth-year learners exhibited significantly higher active interaction scores compared to learners in earlier years, indicating that effectiveness improves with academic progression. This finding aligns with Al-Harhi et al. (2021), who emphasized that academic level development is a key factor in enhancing educational performance, as it refines the application of learning styles rather than the style itself.

Recommendations

Based on the study's findings, the following recommendations are proposed:

1. Integrate Kolb's Experiential Learning Model into e-learning course design, ensuring that learning activities support concrete experience, reflective observation, abstract conceptualization, and active experimentation.
2. Enhance instructional strategies that promote active interaction, particularly those that stimulate cognitive and social engagement through collaborative and problem-based activities.
3. Provide training programs for faculty members on designing experiential and interactive digital learning environments that support diverse forms of learner engagement.
4. Develop structured reflective activities such as digital journals, guided reflections, and discussion prompts to strengthen emotional and cognitive interaction.
5. Adopt adaptive learning technologies that personalize instructional pathways for students with varying engagement levels and academic performance.
6. Reinforce communication channels between students and instructors by promoting timely feedback, open discussion spaces, and accessible support mechanisms.
7. Encourage peer collaboration initiatives through group projects and synchronous sessions to enhance social interaction and active experimentation.

Suggestions for Future Research

1. Conduct studies that examine the relationship between active interaction and academic achievement across larger and more diverse university populations.
2. Investigate the impact of discipline-specific e-learning design on interaction patterns among students in different faculties.
3. Explore longitudinal studies that track changes in active interaction across academic years to identify

developmental trends.

4. Employ mixed-method research designs combining quantitative measures with qualitative interviews to gain deeper insights into students' experiential engagement.
5. Examine the effectiveness of AI-supported experiential learning tools in enhancing active interaction in open and blended learning environments.
6. Investigate gender-related and performance-related factors influencing interaction within specific types of digital learning activities.

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"أثر التعلم الإلكتروني القائم على نموذج كولب التجريبي لتعزيز التفاعل النشط"

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الملخص:

الأهداف: تبحث هذه الدراسة في قياس أثر التعلم الإلكتروني القائم على نموذج كولب للتعليم التجريبي في تلبية احتياجات المتعلمين وتعزيز التعلم النشط في جامعة القدس المفتوحة.

المنهجية: تم اعتماد منهج بحثي كمي، شمل عينة عشوائية مكونة من 450 (121) طالبًا و(329) طالبة من فرع الخليل. جُمعت البيانات باستخدام استبانة موثوقة ومُحكمة صُممت لقياس أربعة أبعاد للتفاعل النشط: السلوكي، والانفعالي، والمعرفي، والاجتماعي، وجميعها مصممة بما ينسجم نظريًا مع مراحل دورة التعلم التجريبي لدى كولب.

النتائج: أظهرت النتائج أن المستوى العام للتفاعل النشط بين الطلبة كان متوسطًا إلى مرتفع. كما تبين وجود فروق دالة إحصائية لصالح الطالبات والطلبة ذوي المعدلات المرتفعة، في حين لم تظهر فروق ذات دلالة إحصائية تبعًا للمستوى الأكاديمي. وأشارت النتائج كذلك إلى أن أبعاد التفاعل النشط تتوافق بشكل جوهري مع المراحل الأربع لنموذج كولب للتعليم التجريبي، مما يدعم ملاءمة النموذج في تفسير أنماط التفاعل داخل بيئات التعلم الإلكتروني.

الخلاصة: تؤكد الدراسة على أهمية دمج فرص للتأمل بعد التجارب العملية، وتشدّد على ضرورة تطبيق المعرفة النظرية في سياقات حقيقية وواقعية. كما تبرز إمكانات التعلم الإلكتروني التجريبي في تنمية التنظيم الذاتي، والدافعية، والتفاعل الهادف لدى الطلبة في بيئات التعلم المفتوح وعن بُعد، وتوصي بدمج نموذج كولب في تصميم المقررات وبرامج إعداد المعلمين لضمان بيئات تعلم إلكترونية ديناميكية تستجيب لاحتياجات المتعلمين المتنوعة معرفيًا وتجريبيًا.

الكلمات المفتاحية: التعلم الإلكتروني، كولب التجريبي، التفاعل النشط.