

**RELATIONSHIP BETWEEN DIGITAL TOOLS AND CRITICAL THINKING
SKILLS AMONG STUDENTS OF FEDERAL COLLEGE OF EDUCATION, KANO**

By

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Abstract

This study aimed to investigate the relationship between the digital tools and the critical thinking skills of the Federal College of Education, Kano students. The incorporation of digital tools into modern education has emerged as a key mechanism through which the depth of learning experiences can be increased, to not only be more engaging, but to enable greater critical reflection and access to novel sources of information. The presence of digital tools affects the critical thinking ability which is a vital cognitive skill considered essential in achieving academic success and making well-informed decisions. This study used a correlational design and aggregated data obtained by administering a self-developed questionnaire to a total of 384 students. Data were analyzed using the Pearson Product-Moment Correlation, showing a moderate to strong positive correlation ($r = 0.529$, $p < 0.05$) between the use of digital tools and the development of critical thinking skills. Findings show the more individuals interacted with digital tools, the better they did at critical thinking. The dialogue explores the role of digital tools in fostering collaborative learning, achieving immediate feedback and considering multiple perspectives, which ultimately strengthens students' analytical skills. And while it supports the initiative to introduce personalized learning through the use of digital tools, it also recognizes the importance of thoughtful implementation of digital tools into pedagogies in out-of-school time programs to ensure the effectiveness tools.

Key Words: Digital Tools, Critical Thinking, Skills

Introduction

Digital tool has become an invaluable tool for education enabling both teaching and learning in novel ways, encouraging 21st-century skill development. Critical thinking is one of the most critical cognitive skills that students must master for academic success and making informed decisions (Facione, 2015). Digital tools (such as online resources, simulations, or collaborative platforms) can have a notable effect on the development of students' critical thinking skills (Hwang, Wu, & Chen, 2011). Of course, digital tools are always at the forefront of our minds when we think about whether they will enhance or hinder students' critical thinking skills, and this discussion offers some of the more relevant research findings and theoretical perspectives to clue us in on a working relationship between digital tools and critical thinking skills among students. Digital tools refer to a type of technology that allow for communication, collaboration, and also facilitate access to information. These might range from learning management systems (LMS), educational software, social media, and multimedia resources (Oblinger & Oblinger, 20005). These tools give students dynamic and interactive engagement with content, which lends itself to deeper exploration and analysis of subjects. Having access to a variety of perspectives and sources of information is of paramount importance in enhancing students' critical thinking skills as they learn to critically assess and synthesize information from various sources (Lai & Hwang, 2016).

During the information age, improvements in the digital landscape contributed greatly to shifts in the global education environment. Instead, students, with the integration of technology in the classroom, are active participants, engaging with content through different mediums. This changing landscape highlights a need for skills beyond gaining information; in particular, the need for one of the most essential cognitive skills: critical thinking (Facione, 2015). Critical thinking is the process of analysis, evaluation, or synthesis of information in order to produce rational arguments or conclusions (Ennis, 1985), and has grown essential in educational environments. They argue the stakes are much higher than simply improving students' scores on standardized tests; we need a generation of educated people who will be equipped to solve complex problems, make informed decisions, and negotiate the challenges of life in the modern world (Bernstein, 2016).

Digital tools in the educational process can include anything from online collaborative platforms to new software applications designed to foster inquiry-based learning. According to research, these tools can enhance critical thinking skills considerably as they allow students to develop their problem-solving and critical analysis (Chau & Cheng, 2015). Online platforms for discussion are one example, as they promote expressing viewpoints, disagreements, and reasoning reflections (Garrison et al., 2001). Educational technologies also ensure that students are not just passive recipients of information but become active participants in their learning experience (Gee, 2003).

Despite the advantages, integrating digital tools effectively into critical thinking has faced multiple challenges. Moreover, educators may not be trained sufficiently in how to use technology effectively, as well as students might have different access to digital resources (Selwyn, 2016). Moreover, the risk of students becoming overly dependent on technology could impede the development of independent thought skills (Gerald et al., 2018). This calls for a mixture of digital and traditional pedagogies that will lead to students developing critical thinking skills (Michell et al., 2019).

One such noticeable discrepancy is in the inconsistent usage of the digital tools across the various forms of education. Some educators use technology in ways that make the classroom interactive and focus on the learner, while others continue to use these tools in ways that don't promote critical engagement (Ertmer & Ottenbreit-Leftwich, 2010). This can lead to students being introduced to digital technologies without adequate guidance in developing their critical thinking skills. Such incongruence can serve as a hindrance to the very teaching goal of assisting students with higher-order thinking (Harris & Rea, 2009). Moreover, a general point of contention is often that there is no agreement on what critical thinking actually is, which means it is challenging to judge how it develops when digital tools are deployed to achieve such ends (Dwyer, Hogan, & Stewart, 2014). Some educators focus on procedural aspects of critical thinking, others cognitive strategies. Within the educational landscape, great variability exists in terms of how skills are defined and the expectations associated (Shah, 2017), which in turn may result in a range of pedagogical approaches — with or without the support of digital tools — that attempts, but does not always succeed, in promoting critical analysis of information with students (Facione, 2015). With such a vague

grasp of critical thinking, we run the risk of creating the substantial barriers that make it impossible even to assess causation – let alone measurement – between educational technology and cognitive skill development.

In addition, students encounter obstacles that restrict their capacity to employ digital tools for critical thinking. Prior knowledge, technological proficiency, and access to resources, for instance, can have a considerable impact on how students use digital tools and practice critical reasoning (Baker & Bosch, 2017). Therefore, identifying these barriers is key to establishing the association between the digital tools use and the improvement of critical thinking skills. However, there are many risks related to autonomous thinking that potential tools do not fully contemplate, risking students critical thinking opportunities (Warschauer 2003) Furthermore, the mechanisms of some digital tools may reward superficial attention instead of deep critique. Some educational technologies are oriented around content at the expense of inquiry or debate (Carr, 2010) Without intentional embedding of these tools in the curriculum, students may employ technology simply as a tool for information indexing rather than as an immersive environment for discovery and critical assessment. Such trends question the actual effect of digital tools over students' engagement in content and ability to think critically. Lastly, the assessments that are used to assess critical thinking in relation to use of digital tools are often not robust and do not correspond to educational goals. Relying predominantly on memoristic and knowledge-recall-based methods of assessment (Stiggins, 2005), traditional assessments seldom include evaluative reasoning and problem-solving capabilities. Importantly; this means that academic institutions are unable to ensure the effectiveness of digital tools in developing critical thinking skills in students. Lack of relevant assessment model makes it difficult to identify clear results in terms of the effects of technology on developing critical thinking skills (Harris, 2016).

Hypothesis

H₀1: There is no significant relationship between the use of digital tools and the development of critical thinking skills among students of Federal College of Education, Kano.

Methodology

Correlational research design was used for the study. Correlational research design is a quantitative research method used to assess the relationship between two or more variables. Instead of manipulating variables as in experimental research, correlational studies seek to identify patterns or associations that naturally occur in data. This design is particularly valuable in fields where controlled experiments may be impractical or unethical, such as psychology, education, and social sciences (Creswell, 2014). The population for this comprises of all the students in Federal College of Education, Kano, with population of eight thousand and fifty students, (8150).The sample size for this study was three hundred and eighty four (384). Accidental sampling procedure was used to administer the questionnaire to respondents. Self-developed questionnaire were used to collect data for the study. Frequency and percent were used to describe demographic characteristics of the respondents, while Pearson Product Moment Correlation was used to test the formulated hypothesis at 0.05 level of significance.

Results

Table 1: Demographic Attributes of Respondents

<i>Variables</i>	<i>Frequency</i>	<i>Percent</i>
Age		
16-18years	45	11.72
19-21years	173	45.05
22-24 years	127	33.07
25 years and above	39	10.16
<i>NCE Level</i>		
NCE 1	98	25.52
NCE 2	150	39.06
NCE 3	136	35.42
<i>Total</i>	384	100.00

Table 1 observed that 45(11.72%) respondents were between the ages of 16-18years, 173 (45.05%) were between the ages of 19-21years, 127(33.07%) were between the ages of 22-24 years, and 39 (10.16%) respondents were between the ages of 25 years and above. Moreover, 98 (25.52%) of students were in their NCE 1, 150 (39.06%) were in NCE 2, and136 (35.42%) of these students were in NCE 3

Test of Hypothesis

Table 2: Summary of Pearson Product-Moment Correlation (PPMC) on use of digital tools and the development of critical thinking skills among students of Federal College of Education, Kano

Variables	Mean	Std. Dev.	N	df	r	P	Decision
use of digital tools	3.7100	0.45979	384	382	0.529	0.0014	Significant
critical thinking skills	3.6000	0.51821	384				

($r_{cal} = 0.529$; $p < 0.05$)

Table 2 presented findings from a statistical analysis using the Pearson Product-Moment Correlation (PPMC) to examine the relationship between the use of digital tools and the development of critical thinking skills among students of the Federal College of Education, Kano. The mean (average) scores are Use of Digital Tools: 3.7100 and Critical Thinking Skills: 3.6000, this indicates that, on average, respondents feel positively about both the use of digital tools and their own critical thinking skills using on a Likert scale, where scores reflect more positive perceptions. The Pearson correlation coefficient for this study is 0.529. A positive value of 0.529 indicates a moderate to strong positive correlation; as the use of digital tools increases, the development of critical thinking skills also tends to increase. This suggests that students who engage more with digital tools likely exhibit better critical thinking skills. The p-value is reported as 0.0014. The p-value assesses the statistical significance of the correlation. P-value less than 0.05 ($p < 0.05$) is considered statistically significant. In this case, since 0.0014 is much lower than 0.05, the result is statistically significant. Therefore, there is a significant relationship between the use of digital tools and critical thinking skills among students.

Discussion

There is significant relationship between the use of digital tools and the development of critical thinking skills among students of Federal College of Education, Kano. Digital tools foster engagement through interactive activities, which can enhance critical thinking. Mayer (2009) suggests that multimedia learning environments that combine text, visuals, and

interactivity result in deeper cognitive processing, leading to improved critical thinking capabilities. Digital tools provide students with access to a wealth of information and varying viewpoints (Jenkins et al., 2006). This exposure is fundamental for developing of critical thinking, as learners must evaluate differing arguments and evidence, fostering analytical skills. For instance, a study by Hwang, Wu, and Chen (2011) found that students who used digital tools to collaboratively solve problems demonstrated significantly improved critical thinking scores compared to those who did not.

Collaborative digital tools, such as forums and shared document platforms, encourage teamwork and the sharing of ideas. This collaboration promotes critical thinking as students must discuss, critique, and build upon each other's ideas (Johnson & Johnson, 2009). Research by Roschelle and Teasley (1995) found that collaborative learning environments facilitate deeper engagement and critical discourse among students. Digital simulations allow students to engage in problem-solving within realistic contexts. Such experiential learning fosters critical thinking as students must apply knowledge, analyze situations, and make decisions based on evidence (Gee, 2005). A study by Chen et al. (2018) demonstrated that students who participated in simulation-based learning showed higher levels of critical thinking than those engaged in traditional instruction. Digital tools often include built-in feedback mechanisms that allow students to reflect on their performance and understanding (Hattie & Timperley, 2007). The ability to receive immediate feedback encourages students to think critically about their learning processes and make necessary adjustments. While digital tools can enhance critical thinking, their effectiveness largely depends on how they are implemented in educational settings. Notably, merely providing access to technology does not guarantee improved cognitive skills. Educators must design intentional learning experiences that integrate digital tools purposefully and foster critical engagement (Ertmer & Ottenbreit-Leftwich, 2010). Additionally, potential distractions within digital environments may detract from focused critical thinking, necessitating strategies to mitigate these effects (Hirsch & Smith, 2018).

Recommendations

Based on the relationship between digital tools and critical thinking skills these recommendations aimed at improving the integration of digital technologies into the educational practices at the Federal College of Education, Kano.

Educational technologies like simulations or role playing activities should be integrated in order to further promote students' analytical skills.

It is important to systematically integrate digital tools into the curriculum as core components of teaching critical thinking skills.

There should be training and professional development for faculty on how to effectively use digital tools to enhance critical thinking.

The faculties should be able to appropriately integrate digital tools in pedagogy.

There should be need for collaborative learning environments that use digital tools to stimulate teamwork and critical conversation.

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