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Enhancing University Students' Digital Behavior: Exploring Individual Learning and Team Leadership Intervening

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Abstract:

Individual learning in students is considered only partially optimal in supporting current digital competencies. To fulfill digital behavioral competencies, team leadership interventions are required through various learning activities undertaken by students. This study aims to analyze the influence of individual learning on students' development of digital behavior mediated by team leadership. Quantitative research methods with AMOS Structure Equation Model (SEM) analysis were carried out with the following stages: validity and reliability testing; SEM model suitability testing to determine the Goodness of Fit model by looking at the Chi-Square, Probability, RMSEA, GFI, AGFI, CMIN/DF, TLI, CFI, and NFI values; research hypothesis testing. The research sample consisted of 301 respondents who were taken randomly from students of Surabaya State University who were implementing the emancipated learning program. This study showed that individual learning affected students' digital behavior. Meanwhile, the mediating role of team leadership on the influence of individual learning on digital behavior consists of dimensions: opportunity to develop (not mediating), transparency (mediating), and creativity (not mediating). The implication of this research shows that the dimensions of transparency that shape students' digital behavior are openness in the learning process, transparent access to information, honest assessment, and open team communication.

Keywords: *Digital Behavior, Individual Learning, Team Leadership*

Abstrak:

Individual learning pada mahasiswa dinilai belum sepenuhnya optimal dalam menunjang kompetensi digital saat ini. Untuk memenuhi kompetensi perilaku digital diperlukan intervensi kepemimpinan tim melalui berbagai aktifitas pembelajaran yang dilakukan oleh mahasiswa. Penelitian ini bertujuan untuk menganalisis pengaruh individual learning mahasiswa dalam menumbuhkan perilaku digital yang di mediasi oleh kepemimpinan tim. Metode penelitian kuantitatif dengan analisis Structure Equation Model (SEM) AMOS dilakukan dengan tahapan: uji validitas dan reliabilitas; uji kesesuaian model SEM untuk mengetahui Goodness of Fit model dengan melihat nilai Chi Square, Probability, RMSEA, GFI, AGFI, CMIN/DF, TLI, CFI, dan NFI; uji hipotesis penelitian. Sampel penelitian berjumlah 301 responden yang di ambil secara random pada mahasiswa Universitas Negeri Surabaya yang melaksankaan program emancipated learning. Hasil penelitian ini didapatkan bahwa

pembelajaran individu berpengaruh terhadap perilaku digital mahasiswa. Sementara itu, peran mediasi kepemimpinan tim pada pengaruh pembelajaran individu terhadap perilaku digital yang terdiri dari dimensi: kesempatan untuk berkembang (tidak memediasi), transparasi (memediasi), serta kreatifitas (tidak memediasi). Implikasi penelitian ini menunjukkan bahwa dimensi transparasi yang menjadi poin dalam pembentukan perilaku digital mahasiswa yaitu: openness in the learning process, clear access to information, honest assessment, and open communication between teams.
Kata Kunci: *Perilaku Digital, Pembelajaran Individu, Kepemimpinan Tim*

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INTRODUCTION

Digital behavior has become an integral part of modern life today. Based on data from the Ministry of Communication and Information, Indonesia's digital literacy index has increased from 3.46 in 2020 to 3.54 in 2022. Digital skills follow this: Indonesia scored 3.34 in 2020 and increased to 3.52 in 2022. Digital behavior has changed the way humans behave, as well as the way they learn and interact. In the lecture process, digital devices such as laptops and internet networks have become mandatory needs for students. Easy access to digital resources allows the learning process to be more flexible and efficient. Technology facilitates learning and enables broader collaboration without geographical limitations (Criollo-C et al., 2021). On the other hand, digital behavior also brings challenges. Addiction to social media and the internet can impair productivity and mental well-being (Raeside et al., 2024; Wies et al., 2021).

Digital behavior becomes essential to help individuals navigate the digital world wisely and responsibly. Along with the development of technology, digital behavior continues to evolve. Understanding the ability to use technology effectively and ethically will be the key to success in the digital age (Zhao et al., 2021). Students who can do individual learning are shown the ability to organize and control their learning process actively. This includes searching for information efficiently, using online learning platforms, and utilizing digital applications to increase productivity (Dietrich et al., 2021). In addition, individual learning is also reflected in the ability to use strategies to achieve learning goals, such as setting goals, managing time, motivating oneself, and adapting learning strategies based on self-evaluation results.

Previous research has shown that individualized learning contributes to students' digital competence, innovation, and behavior supported by increased institutional digitalization (Pan et al., 2024). Personalized individual learning supports learning achievement in terms of improving engagement, retention, and application of knowledge (Chen & Wang, 2021). Individual contributions in organizations are visualized in the form of team leadership to hone team collaboration and communication (Trihantoyo et al., 2023). Effective team leadership contributes to behaviors that can encourage subordinates to adopt innovative behaviors using digital technology (Erhan et al., 2022). Behavior in

the context of higher education can be developed with project-based learning strategies

The current context of learning in higher education is approached with project-based learning methods (Gallagher & Savage, 2023). In this method, students are directly involved in the emancipated learning program. This method encourages students to be actively involved in running various programs or activities carried out in groups. One of the competencies targeted by the learning is team leadership (Michaelsen et al., 2023). Team leadership is directing, motivating, and influencing groups of people to work together to achieve a common goal. It involves effectively leading and managing groups, facilitating communication, and creating an environment that supports productivity and cooperation, a type of individual learning skill. Research by Lin, Jhang, & Wang (2022) showed that individuals who possess individual learning skills tend to be more capable of leading teams effectively. Based on this modern context, the emancipated learning program encourages student team leadership in directing group members to work using information technology so that digital behavior will be formed.

The research problem in this context provides an initial hypothesis that team leadership is a key factor in facilitating practical cooperation and achieving team goals. However, the relationship between individual learning and digital behavior still needs to be fully understood, mainly how team leadership is a mediator in understanding the influence. Digital behavior represents the digital literacy of each individual. Based on information and technology development index data from the Central Statistics Agency (BPS) in 2022, the national index of expertise in the use of information technology and computers is at an index score of 5.85 on a scale of 1-10. The highest index is in the Special Region of Yogyakarta Province, with an index score of 7.77, while East Java Province has an index score of 5.93 (BPS, 2022). By the research setting, this data shows that the digital literacy of people in East Java is moderate and still a serious concern. According to Koeslag et.al. (2021), individuals who engage in self-directed and structured learning can develop skills important for team leadership, including managing time, setting goals, and monitoring progress. Leaders with clear goal orientation and who can organize their learning tend to be more effective in setting and achieving team goals (Gichuhi, 2021). Individual learning skills assist leaders in planning strategies, managing resources, and motivating team members to achieve desired outcomes.

Research by Nikou et al. (2022) shows that individuals with good individualized learning skills tend to be more able to use digital technology to support learning. The ability to self-regulate learning helps individuals to select, use, and evaluate digital tools more effectively. This includes searching for information efficiently, using online learning platforms, and utilizing digital applications to improve productivity. Likewise, leaders who can use digital technologies effectively and promote the use of technology within the team can increase team members' digital adoption and skills. Leaders who are proactive in supporting and guiding digital technologies can help team members be more confident and efficient in utilizing digital tools (Abbu et al., 2022).

Based on the description of previous research above, most research on individual learning and digital behavior tends to focus on the direct relationship between the two variables. Research examining the mediating role of team leadership in emancipated learning programs in higher education still needs to be completed. Learning strategies in higher education need to strengthen 21st-century competencies (Rahmatullah et al., 2022). One form of learning to strengthen these competencies is through learning design. Team leadership as a mediating variable plays an important role in knowing the factors that shape digital behavior in students. The novelty of this study is also seen from the dimensions of team leadership tested, where there are three dimensions in team leadership: opportunities for development, transparency, and creativity. These three dimensions are then used as derivative variables to determine how much the resulting mediation role fosters student digital behavior.

This study investigates how team leadership mediates the influence of individual learning on students' digital behavior at higher education levels. In the context of technology-integrated higher education, students' digital behavior is an important factor that influences academic achievement and competency achievement according to the needs of the world of work. The results of this study are expected to provide deeper insights into how the interaction between individual learning and team leadership can affect students' digital behavior. The findings can serve as a basis for developing learning in higher education to improve individual learning abilities and the quality of team leadership so that students can utilize technology more productively. In addition, this study can contribute to the literature on the factors that influence digital behavior among college students and how universities can support the development of positive digital behavior.

RESEARCH METHOD

This research design uses a quantitative approach. The research method used in this research is a survey method using structure equation model (SEM) analysis. The population of this research is Surabaya State University (UNESA) students who are implementing the emancipated learning program as many as 1230 students. Cluster random sampling was used to collect research data to ensure the sample represented all students. Students who take this program are adjusted to the research objectives, whereas in this program, students carry out team leadership in groups. The sample determination was carried out using the Slovin formula (Ismail et al., 2022) with an error rate of 5% so that the number of respondents was 302 students. Data collection was carried out by random sampling by sending a questionnaire link to students in the form of a Google form with a data collection period in April-May 2024.

The data analysis technique begins with testing the validity and reliability of the instrument. The validity test is carried out by looking at the CFA (Confirmatory Factor Analysis) value with a loading factor value> 0.5 (Marsh et al., 2020). CFA values with loading factors >0.5 indicate a strong relationship between indicators. Meanwhile, the reliability test looks at the

Average Variance Extract (AVE) and Construct Reliability (CR) values. The recommended AVE value is >0.50 (Mertler et al., 2021). If the AVE value on a construct is less than 0.5, there are many errors in the indicator and construct variance value items. The recommended CR value is> 0.7 (Flake et al., 2022). Data is taken from AMOS SEM software to determine the value of AVE and CR.

The next test carried out is the model fit test. This study uses several goodness-of-fit model criteria by looking at the Chi-Square, Probability, RMSEA, GFI, AGFI, PNFI, TLI, PCFI, and NFI values. The following are indicators of the goodness of fit model.

Tabel 1. Goodness of Fit Indicators

Goodness of Fit Index	Cut off Value	Indicator
Chi Square	Expectedly Small	0: perfect fit; the larger the less fit
Significant Probability	≥ 0,05	≥α: fit; α values that can be used: 5%, 1%, 10%
RMSEA	≤ 0,08	≤ 0.05; fit; > 0.10: not fit
GFI	≥ 0,90	0: no fit; 1: perfect fit; ≥ 0.90: fit
AGFI	≥ 0,90	0: no fit; 1: perfect fit; ≥ 0.90: fit
CMIN/DF	≤ 2,00	≤ 2.00: fit
TLI	≥ 0,95	0: no fit; 1: perfect fit; ≥ 0.90: fit
CFI	≥ 0,95	0: no fit; the larger the fit
NFI	≥ 0,95	0: no fit; 1: perfect fit; ≥ 0.90: fit

Source: data processed by researchers (2024)

Based on the goodness of fit indicators above, the model is fit if three or more indicators are in the fit or marginal fit category. The next stage of analysis is hypothesis testing. Direct hypothesis testing uses AMOS SEM, while indirect hypothesis testing is carried out by the Sobel test tool. If the p-value for each hypothesis is <0.05, it is declared influential and vice versa.

RESULT AND DISCUSSION

Result

The learning design at UNESA has been directed towards forming students' digital behavior. UNESA developed a learning management system platform, SIDIA. The learning system emphasizes project methods and case study approaches that prioritize group or teamwork. This learning model aims to train students' collaborative, problem-solving, critical thinking, and creativity skills. Project-based learning represents real-world life and phenomena, helping students apply their knowledge practically. The group learning system applied can support this research framework.

Descriptive analysis of the research looks at each standard deviation score and mean on the statement items of each instrument item. The average score in the individual learning variable is 4.08, which is a very high category; this shows that lifelong learning and solving real-world problems as students' capital in implementing the emancipated learning program are outstanding. Meanwhile, the average score in the team leadership variable was 3.82, which is a high category. Students can take action in the aspects of opportunity to develop, transparency, and creativity. In the digital behavior variable, the

average score is 3.66, which is a high category, meaning that student behavior in terms of team management skills, actions for accomplishing team goals, and attitudes and behaviors that improve team cohesion are in a suitable category.

The construct validity test uses the confirmatory factor analysis (CFA) value. Construct validity is declared valid if it has a factor loading value (estimate)> 0.5. The following is a picture of the CFA results with the outer model.

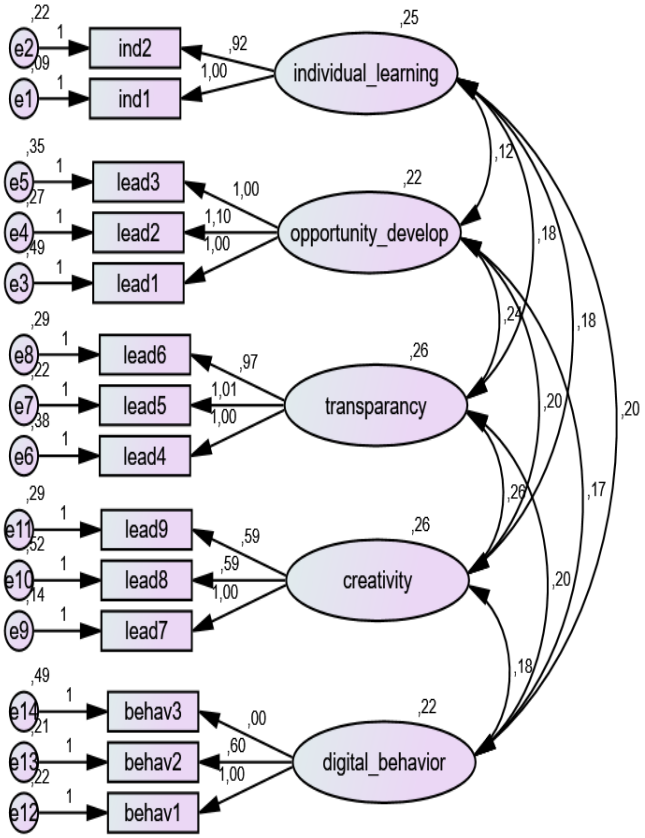

Figure 1. CFA Results
(Source: data processed by researchers, 2024)

Based on the CFA results picture, one analysis result was obtained with a value of 0.00 on the digital behavior variable with behavior indicator 3. This indicator is declared invalid and will not be used in the next test. Meanwhile, in other indicators, the loading factor value is> 0.5 so that it is declared valid. It can be concluded that all indicators that are declared valid reflect each endogenous variable and are a single indicator under study.

In measuring the model, this study analyzes the AVE and CR values. Based on the recommended value for AVE value> 0.5 and CR value> 0.7, the calculation results in the table of AVE and CR values show that each variable in this study has met the overall requirements for the model measurement test by looking at the AVE and CR cut off values as a whole. It can be concluded that the AVE value on the variance extracted from the indicators is more significant for forming latent variables. Meanwhile, based on the CR value, it can be concluded that this research has good internal consistency. The following table shows the AVE and CR values.

Table 2. AVE and CR Values

Variabel	AVE Score	CR Score
Individual Learning	0,54359	0,703196
Opprotunity to Develop	0,518136	0,761601
Tranparancy	0,589986	0,748928
Creatifity	0,616109	0,731321
Digital Behavior	0,637835	0,775902

Source: data processed by researchers, 2024

The SEM model fit test is carried out by looking at several goodness of fit model criteria by looking at the Chi-Square, Probability, RMSEA, GFI, AGFI, PNFI, TLI, PCFI, and NFI values. Based on the instrument validity test, one variable is excluded and not used as the basis for testing this model. The following is the structural model in this research analysis.

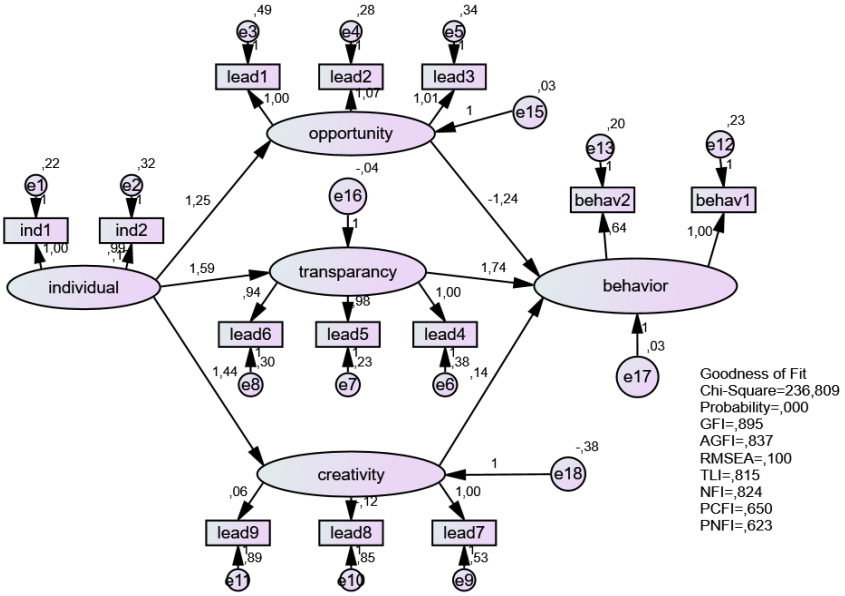

Figure 2. Research Model Test Results
(source: data processed by researchers, 2024)

Based on the results of the structural model estimation, the results of the model fit test are as follows.

Table 3. Model Fit Test Results

Goodness of Fit Index	Cut off Value	Test Results	Model Evaluation
X2-Chi-Square	Expectedly Small	236,809	Not Fit
Significant Probability	≥ 0,05	0,000	Not Fit
RMSEA	≤ 0,08	0,100	Marginal Fit
GFI	≥ 0,90	0,895	Marginal Fit
AGFI	≥ 0,90	0,837	Marginal Fit
PNFI	≤ 2,00	0,623	Fit
TLI	≥ 0,95	0,815	Marginal Fit
PCFI	≥ 0,95	0,650	Not Fit
NFI	≥ 0,95	0,824	Marginal Fit

Source: data processed by researchers (2024)

Based on the results of the model fit test in the Table 3, it is known that it has met one goodness of fit criterion, and five criteria are at the marginal fit limit. It can be assumed that the model fits with the research data.

This research hypothesis test has four hypotheses with direct and indirect effects. In the direct effect test, namely the effect of individual learning variables on digital behavior, the direct effect test obtained an estimated value of 0.74 with a p-value of 0.000, which means that individual learning affects student digital behavior. The following is the direct effect test.

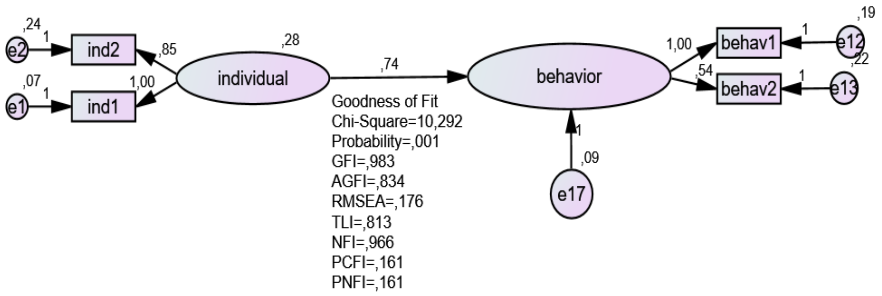

Figure 3. Direct Effect Test

The following hypothesis test shows the indirect effect on the mediating variable with three dimensions measured: opportunity to develop, transparency, and creativity. In this indirect test, researchers used the Sobel test tool.

Table 4. Indirect Test

Path	Sobel Test		Conclusion
	t-Stat	P Value	
individual→ opportunity→ behavior	-1,58	0,11	Not significant
individual→ transparancy→ behavior	2,61	0,00	Significant
individual→ creatifity→ behavior	1,03	0,299	Not significant

Source: data processed by researchers (2024)

Based on the results using the Sobel test, one dimension in the team leadership variable mediates namely transparency, with a t-statistic value of 2.62 and a p-value of 0.000. Meanwhile, the dimensions of opportunity and creativity do not mediate. The following presents the overall results of the research hypothesis test.

Table 5. Hypothesis Testing Results

No	Hypothesis	Estimate/ t-Stat	P Value	Conclusion
1	The influence of individual learning on digital behavior	0,737	0,000	Influential
2	Mediation of opportunity to develop the influenceof individual learning on digital behavior	-1,58	0,11	Not mediating
3	Mediation of transparency on the effect of individual learning on digital behavior	2,61	0,00	Mediate
4	Mediation of creativity on the effect of individual learning on digital behavior	1.03	0,299	Not mediating

Source: data processed by researchers (2024)

Based on the research hypothesis in testing the effect of individual learning on digital behavior, the p-value is 0.000 or <0.05. This indicates that individual learning embedded in students can shape digital behavior by 0.737. Meanwhile, in the test of each dimension in the team leadership variable, it was found that only the mediation of transparency in the influence of individual learning on digital behavior had a p-value <0.05, which is 0.000. This means that transparency is the most influential aspect of shaping digital behavior. This means that transparency is the most important aspect of building team leadership.

Meanwhile, the mediation of opportunity to develop obtained a p-value of 0.11; this value is> 0.05, so it does not mediate. Likewise, the mediation of creativity with a p-value of 0.299 means it does not mediate. This indicates that the opportunity to develop creativity in team leadership does not trigger the formation of digital behavior in students who implement the emancipated learning program.

Based on the data analysis above, the results of hypothesis testing are obtained by formulating this research problem, as described below. Where in this study, four hypotheses formulate the research problem, namely: (1) the effect of individual learning on digital behavior; (2) mediation of opportunities to develop on the effect of individual learning on digital behavior; (3) mediation of transparency on the effect of individual learning on digital behavior; (4) mediation of creativity on the effect of individual learning on digital behavior. The following are the results of the research model.

Figure 4. Research Model Results

Discussion

Influence of Individual Learning on Digital Behavior

Based on the results of the direct effect analysis using SEM AMOS on the effect of individual learning on digital behavior, the p-value is 0.00, where this value is <0.05, and the estimated value is 0.737, so it can be concluded that it has a significant positive effect. The higher the students' efforts to improve individual learning, the higher their digital behavior will be. This is reinforced

by the research results by Liu et al. (2022); students with good individual learning skills tend to be more effective in using digital tools for learning, reducing procrastination, and increasing academic engagement. These positive behaviors represent the process of individual learning. This process refers to an individual's ability to actively manage their learning process, including various strategies and behaviors that help individuals achieve academic goals independently (Jiménez et al., 2023; Wolters & Brady, 2021).

Based on the descriptive data of the research on individual learning, the score is 4.08, which is a very high category. The dimensions used in this variable are lifelong learning and solving real-world problems. Lifelong learning in students is formed as a process in individual learning. This process includes various forms of learning, both formal and informal. The importance of lifelong learning in individual learning is undeniable. In the context of rapid technological and economic changes, the ability to continue learning and adapting becomes very important. Today's world of work requires individuals to constantly update their skills and knowledge to remain relevant and competitive.

Students must also master real-world problems; the relationship between real-world problems and individual learning has become a significant focus of contemporary educational research. Problem-based learning involving real-world situations can increase learning engagement and motivation. In the study, individuals who are faced with real problems tend to be more active in the learning process, as they can see the direct relevance between what they are learning and their daily life situations (Ghani et al., 2021). The problem-based learning approach allows students to analyze complex situations better and develop innovative solutions to real-world problems. The problem-based learning approach is also approached with various digital platforms to solve it. Various digital platforms can improve individuals' interpersonal and collaborative skills (Tavares et al., 2021). This means that individual learning carried out by students, especially in the aspects of lifelong learning and solving real-world problems, can shape digital behavior.

Mediating Opportunities for Developing an Influence of Individual Learning on Digital Behavior

Based on the results of data analysis on the mediation of opportunity to develop the effect of individual learning on digital behavior, the p-value is 0.11, where this value is> 0.05, so it is concluded that it does not mediate. This illustrates that the opportunity to develop in team leadership does not mediate the effect of individual learning on student digital behavior. This means that the team leadership in the emancipated learning program does not impact the formation of students' digital behavior. Although this result shows the insignificance of mediation, this finding is in line with research conducted by Megheirkouni & Mejheirkouni (2020), which revealed that in the context of individual learning, other factors are more dominant in influencing students' digital behavior, such as external factors including digital environment, social support, and individual motivation.

Furthermore, research supports this finding by suggesting that internal factors, such as individual motivation in digital learning, can be more dominant than mediating factors, such as opportunities for growth in team leadership. These results confirm that in designing digital behavior development strategies, it is necessary to consider the influence of internal and external factors holistically. Nonetheless, this study contributes to understanding the complexity of the relationship between individual learning and students' digital behavior. The practical implication of this finding is the need for a more holistic approach in designing digital learning programs, which not only focus on individual aspects but also consider internal and external factors that can influence students' digital behavior.

Mediating Transparency as an Influence of Individual Learning on Digital Behavior

Based on the results of data analysis on the mediation of transparency on the effect of individual learning on digital behavior, the p-value is 0.00, where this value is <0.05, so it is concluded that it can mediate. This means that the transparency aspect can mediate the effect of individual learning on the formation of student digital behavior. This indicates that aspects of transparency in team leadership in student groups are needed and play an important role in the growth of digital behavior. Transparency refers to openness in the learning process, transparent access to information, honest assessment, and open team communication. This result is reinforced by the research results by Al-Adwan et al. (2021); transparency in communication and assessment can increase student engagement and participation in digital collaboration, increasing positive digital behavior.

The transparency dimension of learning is an effective intervention in learner retention. Transparency in Teaching and Learning (TILT) methodology is intended to have a positive impact regardless of the course or course modality. Studies have shown that individuals who attended language courses that were intervened in by transparent methods experienced an increased awareness of their skills compared to learners who were not intervened in by TILT methods.

Transparency shifts the top priority from technical skill development to critical thinking and active, collaborative learning. Using transparent methods allows others to contribute and engage in the larger community. The transparent model has become part of how transparency has evolved into collaborative learning, providing opportunities for individuals to be more collaborative. The mediating role of transparency enables individuals in teams to create an interactive, open, communication-based learning environment.

Mediating Creativity as an Influence of Individual Learning on Digital Behavior

The results of data analysis on creativity mediation on the effect of individual learning on digital behavior obtained a p-value of 0.299, where this value is> 0.05, concluding that it is insignificant or does not mediate. Although the previous hypothesis has tested that individual learning significantly affects

students' digital behavior, research by Arizmendi et al. (2023). This research also shows that individual learning significantly directly affects students' digital behavior. Arizmendi et al. (Arizmendi et al., 2023) show that individual learning is important in developing efficient digital behavior without needing mediation from creativity. This indicates that the creativity aspect does not mediate the influence of individual learning on the formation of students' digital behavior. Riswanti et al. (2022) found that individual digital literacy is more influenced by self-learning activities and digital exploration rather than creativity. These results indicate that digital skill development depends more on direct individual learning (Dalgıç et al., 2024).

Each individual has a different learning style, defined as a belief, preference, and behavior implied in learning under certain conditions. Consequently, each individual ultimately produces a preferred way of receiving and managing information to create creative solutions. This study concluded that learners who do individual learning can find creative solutions to problems because of their high self-efficacy. Individual learning boosts students' self-confidence, enhancing learning outcomes and creativity. High self-efficacy resulting from individual learning helps unlock creative potential and fosters problem-solving.

CONCLUSION

Students' level of individual learning when using various digital devices dramatically influences the formation of digital behavior. Implementing the emancipated learning program in groups followed by students raises the competence of team leadership. Based on data analysis from the research context, there are three dimensions in translating team leadership: opportunity to develop, transparency, and creativity. Of the three dimensions, only transparency can mediate the influence of individual learning on students' digital behavior.

This finding implies that with problem-based learning methods in emancipated learning programs, especially in team leadership, transparency is needed for each team member. Program managers in higher education need to pay attention to aspects such as openness in the learning process, transparent access to information, honest assessment, and open communication between teams. This finding also captures the fact among students that the high effort made in individual learning also reflects the ability to find creative solutions. For educational practitioners, the results of this study indicate that lifelong learning and solving real-world problems are learning programs designed to improve students' digital behavior.

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