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# Assessing the Impacts of IT Usage, IT Adoption, and Innovation Capabilities in Increasing the Hybrid Learning Process Performance

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**Abstract.** The disruptive changes of technological advancements and the COVID-19 pandemic have pushed the education sector to leap into a new learning model, known as hybrid learning. Hybrid learning implements both onsite and online learning to students simultaneously. This research aims to display the impacts of information technology (IT) usage, IT adoption, and innovation

capabilities to increase learning process performance during hybrid learning. This research has used a quantitative approach by gathering survey data from 1,160 college students during a hybrid learning process. Hybrid learning had been conducted for four months before the survey was taken in December 2021. The findings show that IT usage, IT adoption, and innovation capabilities significantly affect the hybrid learning process performance. Moreover, IT adoption has the most robust beta coefficient, followed by innovation capabilities and IT usage. Therefore, this research posits that the hybrid learning process performance greatly depends on the adoption of IT, followed by the innovation capabilities of the lecturers. IT usage also supports the hybrid learning process performance. Thus, the three variables are essential in successfully maintaining the hybrid learning process.

**Keywords:** hybrid learning; IT usage; IT adoption; learning process performance; innovation capabilities

## 1. Introduction

People's lives today cannot be readily separated from the world of technology. Information technology (IT) has been solidified as a critical component in sustaining corporate strategy and quickly adapting to changes in the competitive environment (Yoshikuni & Albertin, 2015). Anecdotal data and case studies show that effective and efficient IT utilization is a fundamental differentiator between successful and less successful businesses (Bharadwaj, 2000).

Digital transformation has been a massive disruption to all aspects of people's lives. This condition is further exacerbated by the COVID-19 pandemic that began at the beginning of 2020 (Hu et al., 2020; Koubaa, 2020; Untaru & Han, 2021). In Indonesia, and indeed internationally, people have been 'forced' to implement the 'new normal', and they are in dire need of technological support. This need is a result of all people's behavior directed to run digitally. Physical restrictions on movement, due to COVID-19 lockdowns, have made people rely on internet technology (internet of things) and innovative technology (smart technology) to continue their activities (Cho & Lee, 2020; Marinova et al., 2017).

The education sector is one of the most changing industrial sectors, besides the health sector. Education is a form of service to the community, especially the local community, who need to access education properly. The education sector is the most critical in improving the quality of human resources. The education sector determines the nation's future, so it needs serious attention.

With social restrictions and school closures in early 2020 (Clark et al., 2021), all educational institutions, formal and non-formal, ranging from kindergarten to college, had to endeavor to keep the learning process going. Digital learning applications that previously felt unfamiliar appeared, such as Zoom for online meetings, Google Classroom, and other learning management systems (LMS), for classwork, assignments, problems, etc. (Chang & Tung, 2008; Graham, 2006; Q. Li et al., 2021). Teachers also became more creative in teaching and learning using interactive learning applications such as Quizizz, Kahoot, Flipgrid, and Padlet.

The indicators of the success of the online learning process are primarily determined by the participatory and collaborative levels of the learners (Caskurlu et al., 2020; Irawan et al., 2020; Peerapolchaikul et al., 2019; Ruthmann & Hebert, 2012). Although flawed, after more than 1.5 years of the pandemic, all components incorporated in education have begun to adjust to this digital learning process.

At Indonesia's Merdeka Belajar Kampus Merdeka (MBKM) (Tohir, 2020), the role of students is very much concerned with the concept of student-centered learning, where the learning process in Merdeka Campus is centered on students as the focus of learning. Crucial to learning in Merdeka Campus are the challenges and opportunities in self-development, innovation, increasing creativity, capacity, personality, and independence in seeking and finding knowledge through reality and field dynamics, such as ability requirements, real problems, social interaction, collaboration, self-management, performance demands and targets.

Key performance indicators are the foundation of higher education transformation in implementing the Independent Campus program at MBKM. One of the key performance indicators (IKU) focuses on the collaborative learning process as essential in developing students' capacities and capabilities in terms of the ability to face the actual demands of society and the world of work. In IKU 7, collaborative and participatory classes are launched, where evaluation, based on group projects or case study methods, is the basis of the ability developed so that students can be independent and ready to face challenges.

Since September 2021, under the improvement of COVID-19 conditions, the Indonesian government lowered the level of the pandemic to level 1, and this allowed educational institutions to conduct hybrid learning by combining online learning (online) with face-to-face learning (onsite) (Li et al., 2021). Previous research has associated this learning with blended learning (Draper & Hitchcock, 2008; Graham, 2006; Wendy et al., 2020). This type of learning is known as limited face-to-face learning.

Most new educational institutions are starting to implement blended learning and hybrid learning. However, hybrid learning will be a challenge that eventually must be implemented. As stated by Snart (2010), significant usage of hybrid courses has followed a delayed development trajectory, with diverse (though related) economic, pedagogical, and technological reasons driving adoption across the country. Nevertheless, following the direction of the government, limited face-to-face learning is defined as a learning process that combines both online and face-to-face learning simultaneously so that all online and face-to-face learners get the same learning and treatment materials. In addition, hybrid learning provides its challenges, especially with increasing participation and collaboration from all onsite and online learning learners.

Chen and Chiou (2014) posited that students in a hybrid course had considerably greater learning scores and satisfaction than students in face-to-face classes. Students in hybrid learning classrooms also reported a better feeling of community than students in traditional classrooms. Learning style had a significant impact on learning outcomes in the study group. Likewise, multiple-strategy learning systems may provide considerable advantages over single-

strategy learning systems. Such hybrid systems are employed to a wider range of situations since the type of input and learned knowledge are more versatile (Bala et al., 1995). On the contrary, some recent studies have shown a drastic decline in child development, both socially and intelligently (Clark et al., 2021; Irawan et al., 2020). The performance of learners tested through a value-based assessment and evaluation process is no longer valid because of the difficulty of supervision when learners carry out exams.

The application of hybrid learning causes teachers to organize the teaching and learning process to two types of participants directly (Chen & Chiou, 2014; Mossavar-rahmani & Larson-daugherty, 2007): providing online teaching through online video conferencing such as Zoom, Google Meet, etc., and learners who present at the location. This situation challenges the learning process before being 100% online. Many educational institutions have difficulty adapting to this hybrid learning process (Snart, 2010) due to infrastructure limitations, overlapping technologies, and limited teaching staff ability, which confuses learners.

In this study, the authors took the example of educational institutions implementing hybrid learning with high-end technology as an essential guide in applying technology in other educational institutions. This research hopes a clear understanding can be obtained about the minimum requirements that must be met and best practices in carrying out hybrid learning.

The main focus of this research, especially for educational institutions, is the learning process. The learning process during the COVID-19 pandemic period is precisely a benchmark for success in learning because the active participation that occurs during the learning process indicates the success of knowledge transferred to learners. A new learning modality, called hybrid learning or blended learning, has been established to deal with the loss of face-to-face contact between students and instructors that occurs in remote learning.

When compared to pure virtual e-learning, Dodero et al. (2003) believed that hybrid learning fosters more student participation. Additionally, an educational institution's mastery of technology and innovation ability needs to receive special attention so that the skills possessed by all teaching staff are evenly distributed and that they can provide the same standards of academic quality to all learners. Mastery of technology may be a serious challenge because of possible generation gaps and adequate facilities and infrastructure. Furthermore, the opportunity to innovate, that requires creativity from teachers to make the learning process more interactive and fun, is often missed because teachers have not mastered the technology, have not adapted, or even felt comfortable enough with conventional learning systems. As the use of hybrid courses and institutional interest in expanding their usage grows, such challenges must be addressed (Snart, 2010).

Despite the difficulties, all studies are cautiously optimistic about synchronous hybrid learning, which provides a more flexible and engaging learning environment than purely online or fully on-site education. Raes et al. (n.d.) concluded that most of the available literature is still exploratory and qualitative

in nature, focusing mostly on the description of students' experiences, organizational implementation, and technology design.

From the background that has been discussed, the study formulated the following research questions:

1. *Does IT usage significantly influence the learning process performance during the hybrid learning implementation?*
2. *Does IT adoption significantly influence the learning process performance during the hybrid learning implementation?*
3. *Do innovation capabilities significantly influence the learning process performance during the hybrid learning implementation?*

## 2. Literature Review

Learning today is no longer a problem of one institution only. This problem is common because the learning going on during the COVID-19 pandemic proved to be ineffective and could not provide maximum results in learners' progress. Distance education, previously implemented online, has changed into hybrid learning. Many adjustments need to be made so that there is no imbalance in the quality of the learning process for learners who follow the learning process onsite and online. The combination of leading-edge technology use, technological innovation, and technology adoption is expected to improve the effectiveness and performance of the limited face-to-face learning process currently widely adopted by local educational institutions.

### 2.1 Technology Acceptance Model (TAM)

While much progress has been made in understanding the factors that influence IT adoption and IT usage (Venkatesh et al., 2003), the low level of IT adoption and usage remains a fundamental difficulty (Overby, 2002; Gross, 2005). This research uses the TAM theory (technology acceptance model) as the leading theory to implement this research. Davis' TAM theory explains that the technology acceptance model (TAM) is a model for predicting and explaining how technology users receive and use technologies related to the users' work. The TAM model comes from psychological theory to explain the behavior of information technology users based on belief, attitude, intention, and user behavior relationships (Venkatesh & Bala, 2008; Venkatesh & Davis, 2009). One factor that can influence users is their perception of the usefulness and ease of use of IT so that one's reasons for seeing the benefits and ease of use make the person's actions acceptable to the use of information technology (Loureiro et al., 2020; Scherer et al., 2019; Yoon & Kim, 2017). TAM theory explains the relationship among high-end technology application variables, technology control, and the ability to innovate in improving the limited face-to-face learning process that focuses on improving active and collaborative participation.

### 2.2 IT Usage

A previous study on IT usage found a moderately substantial direct impact of information system (IS) utilization on performance (Gowan & Mathieu, 2005; Legris et al., 2003). Yoshikuni and Albertin (2015) posited that the use of information technology is a critical resource to support essential business

processes. Several studies have shown that one of the most critical aspects of performance is the extensive usage of technology (Chan et al., 1997; Ju et al., 2013). Likewise, Bharadwaj (2000) posited that organizations with high IT capability outperform a control sample of firms on a range of profit and cost-based performance criteria. Dodero et al. (2003) demonstrated how information technology may motivate students to participate in traditional classroom-based instruction, but that it cannot do so when the learning process is entirely virtual and not supplemented by regular classes.

Thus, the hypothesis can be formulated as follow:

*Hypothesis 1: IT usage has a significant influence on the hybrid learning process performance*

**2.3 IT Adoption**

Previously, scholars who used a resource-based approach to IT stated that because IT investments are easily replicated by competitors, investments in IT do not deliver long-term benefits. Instead, its effectiveness is determined by how well it uses its capital to develop unique IT resources and talents. (Clemons, 1986; Clemons & Row, 1991; Mata et al., 1995). Consequently, IT resources and skills are heterogeneously allocated across enterprises, despite highly technological investments, resulting in IT use and effectiveness disparities.

Previous studies showed that hybrid learning combines the best aspects of traditional face-to-face learning with technology-based online learning (Dodero et al., 2003; Garrison & Kanuka, 2004; Graham, 2006; Olapiriyakul & Scher, 2006; Raes et al., n.d.).

Thus, this research formulates the second hypothesis as follows:

*Hypothesis 2: IT adoption has a significant influence on the hybrid learning process performance*

**2.4 Innovation Capabilities**

Unlike innovation, innovation capabilities emphasize that such indigenous scientific capabilities entaile much more than research and development. Three different types of scientific and technological endeavor were highlighted in particular: testing, standards, surveying, and extension services; scientific and technological education and training; and activities concerned more directly with the application of science and technology in industrial and agricultural production, such as design, engineering, production control, and medical services (den Hertog et al., 2010; Yang et al., 2009; Bell, 2009).

In poor countries, the number of innovative capabilities developed and amassed has been quite restricted, and much of what has been accumulated has had little link to critical components of growth. As a result, developing and amassing such competencies must be given much higher emphasis. Unlike popular belief, boosting innovation capacity should not be viewed as a (questionably efficient) substitute for obtaining technology from international sources. Instead, it is required to develop a considerably higher volume and diversity of local innovation, which supplement the role of technology imports.

Bell (2009) claimed that it is not just more innovation capabilities that are needed; the composition of innovative capability also needs to be massively shifted. Greater attention needs to be given to kinds of capability that are not just R&D capabilities. These include various forms of design and engineering capabilities, and other kinds of change-generating knowledge and skill. At the same time, greater attention needs to be given to creating and accumulating those different kinds of innovation capabilities in organizational locations that differ sharply from those that have attracted policy priority in the past.

The six dynamic service innovation skills described are signaling user demands and technological possibilities; conceptualizing; (un-)bundling; co-producing and orchestrating; scaling and stretching; and learning and adapting. Successful service innovators, which could include manufacturing enterprises evolving into service solution providers, surpass their competition in at least some of these capabilities (den Hertog et al., 2010). Chen et al. (2020) found that the association between organizational innovation and business performance was primarily mediated by technological innovations, according to structural equation modeling (SEM) investigations. Similarly, organizational innovation reduced the link between technological innovation capabilities and firm performance to some extent.

Specific capabilities, such as organizational competencies, routines and processes, that businesses already have or are developing to manage the process of service innovation, are referred to as dynamic service innovation capabilities. In practice, this entails integrating existing resources and operational capabilities with the creation of new ones in order to achieve (temporary) competitive advantage and a current service offering (den Hertog et al., 2010).

Li et al. (2020) analyzed data connected to firms' research and development (R&D) related activities and performance in technological innovation using machine learning-based experimental methodologies. In this era of rapid technological development, the proposed model allows accurate anticipation of firms' innovation efficiency, which aids business managers in making better decisions about their organizations' innovation performance.

Thus, the third hypothesis can be formulated as follows:

*Hypothesis 3:* *Innovation capabilities have a significant influence on the hybrid learning process performance*

The three hypotheses formulated can be shown in the following research framework (Figure 1).

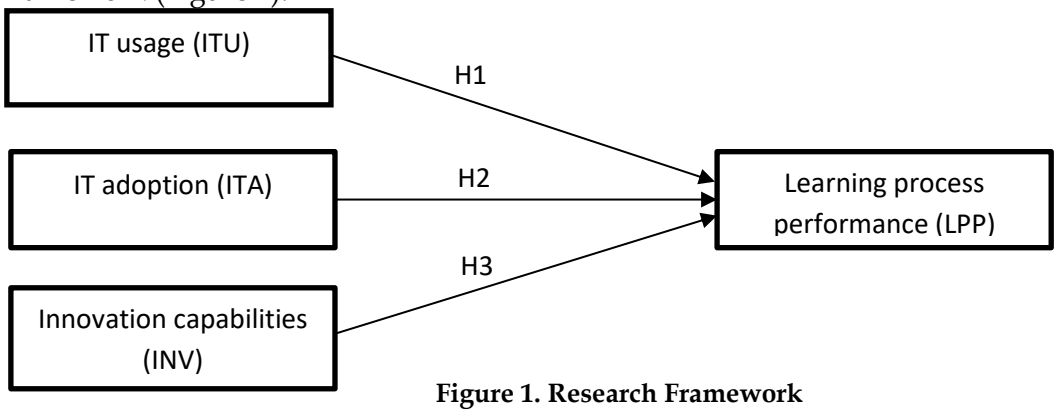


**Figure 1. Research Framework**

## 3. Research Methodology

This research has used a quantitative approach by conducting hybrid learning for four months, from September 2021 to December 2021, in a private university in Indonesia. The private university has five branches spread all over Indonesia, namely Jakarta, Tangerang, Bekasi, Bandung, and Malang.

Figure 2 shows the steps of research conducted from the beginning until the drawing of conclusions.

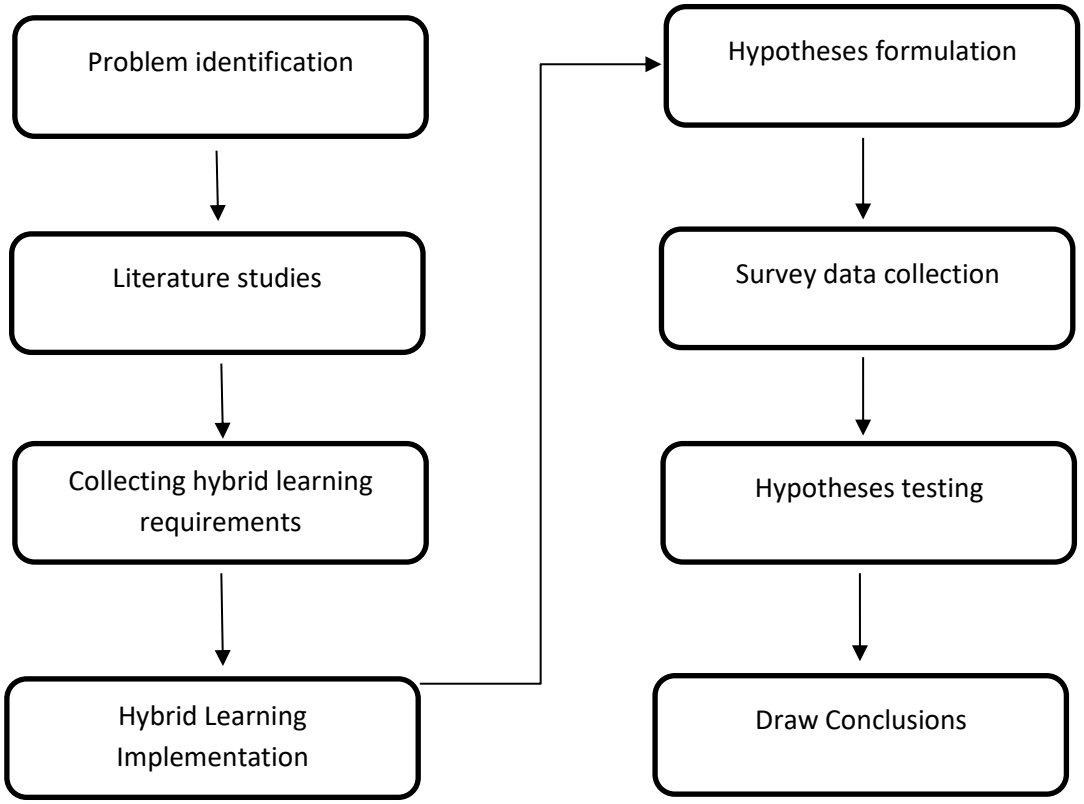


**Figure 2 Research Design**

### 3.1 Research Setting

This study takes the example of hybrid learning that has been applied by one of the private universities in Indonesia that prioritizes technology in campus operations and learning. This research may provide excellent benefits because it may guide other educational institutions in implementing hybrid learning in the learning process by integrating high-end technology.

In addition, to support the research setting and validation, the following software and hardware technology were adjusted for hybrid learning (Table 1).

**Table 1. Software and Hardware Technology Adjustments for Hybrid Learning**

| Software | Hardware |
|---|---|
| Learning management system (LMS) that has been integrated with video conference technology (video conference link information, host access automation, and attendance recording automation), thus accommodating both asynchronous and synchronous learning. | Pan-tilt-zoom Camera (PTZ) and document camera (lumens) display learning materials and lecturers. |
| Contact tracing application that serves to record the health and movement of students and teaching staff. | Use Logitech speakers and a microphone table for audio tools during teaching and learning. |
| Eligibility status application determines whether students and faculty are entitled to enter the campus area. | Mobile phone |

### 3.2 Data Sampling and Data Collection

This research takes students, lecturers, and assistants as the source of information. The total population of active students who participated in limited onsite teaching in the odd semester 2021/2022 at the university was 11,747 students, with an onsite student composition of 3,170 students and as many as online 8,577 students. Meanwhile, the entire sample to be used is as follows 1,160 students (9.87%). The parties involved in this research are students, lecturers, and assistants who carried out the hybrid learning process in odd semester 2021/2022.

The data collection was done using a questionnaire by scoring 0 for Not applicable, 1 for Strongly Disagree, 2 for Disagree, 3 for Somewhat Disagree, 4 for Somewhat Agree, 5 for Agree, and 6 for Strongly Agree. As the previous studies on hybrid learning are still limited, the instrument was newly made and validated by experts. The questionnaires were then distributed online using a Microsoft form to the five branches of Jakarta, Tangerang, Bekasi, Malang, and Bandung. A total sample of 1,160 students were taken for analysis.

### 3.3 Research Validation and Reliability

Before the hypotheses testing, the items used in the research were tested for validity by using the extraction method in the principal component analysis (Table 2), resulting in eight valid items, and any items below 0.5 were extracted and not used. This method uses the dimension reduction analysis available in the SPSS Statistic tools.

**Table 2. Extraction Method using the Principal Component Method Analysis**

| Items | Questions | Factor Analysis |
|---|---|---|
| ITU1 | Lecturers/assistants can be seen clearly. | 0.687 |
| ITU2 | Lecturer's/assistant's voice can be heard clearly. | 0.646 |
| ITU3 | Onsite student voices can be heard clearly by online students (and vice versa). | 0.524 |
| INV | In-class learning activities can be delivered effectively (presentation, discussion, quiz, etc.). | 0.585 |

| | | |
|---|---|---|
| ITA1 | Practicum activities can be followed by onsite and online students well. | 0.513 |
| ITA2 | Shared teaching material by Lecturers/Assistants during ViCon/F2F sessions can be seen clearly. | 0.673 |
| LPP1 | Lecturers'/assistants' interaction with online and onsite students can run effectively. | 0.607 |
| LPP2 | Teaching material can be easily understood. | 0.653 |

## 4. Findings and Discussion

### 4.1 Findings

To assess the models' performance thoroughly and accurately, we used the SPSS Statistic tools to test the relationships between the variables. Table 3 shows the distribution of respondents based on the learning mode chosen by the students. As seen in the table, out of 1,160 students, the sample percentage of online students is 59,4%, and the percentage of onsite students is 40.6%. The onsite students are divided into two groups, A and B.

**Table 3. Distribution of Respondents based on the Learning Mode**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Online | 689 | 59.4 | 59.4 | 59.4 |
| | Onsite Team A (Week 1-6) | 342 | 29.5 | 29.5 | 88.9 |
| | Onsite Team B (Week 8-13) | 129 | 11.1 | 11.1 | 100.0 |
| | Total | 1,160 | 100.0 | 100.0 | |

**Table 4. KMO and Bartlett's Test**

| | | |
|---|---|---|
| **Kaiser-Meyer-Olkin Measure of Sampling Adequacy** | | .889 |
| **Bartlett's Test of Sphericity** | Approx. Chi-Square | 4,235.243 |
| | Df | 36 |
| | Sig. | .000 |

In the KMO and Bartlett's test table, the KMO measure of sampling adequacy (MSA) is 0.889 with (0.889 > 0.5). The result demonstrates the sample's adequacy. The KMO and Bartlett's test for Chi-square is 4,235.243, with a significance value of 0.000. The value indicates a correlation between variables and that the process can be extended.

**Table 5. Levene's Test of Equality of Error Variances**

**Dependent Variable: LPP**

| F | df1 | df2 | Sig. |
|---|---|---|---|
| 2.961 | 318 | 841 | .000 |

The Levene test tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + ITU + ITA + INV + ITU * ITA + ITU * INV + ITA * INV + ITU * ITA * INV

Levene's test is an inferential statistic used in statistics to assess if the variances of two or more groups are identical. In several conventional statistical processes, the variances of the populations from which separate samples are obtained are considered equal. Levene's test is used to evaluate this assumption. According to Levene's test, the resulting *p* value of Levene's test is 0.000 less than 0.05. As a result, it is discovered that the population variances differ.

**Table 6. Correlations Test**

| | | LPP | ITU | ITA | INV |
|---|---|---|---|---|---|
| **Pearson Correlation** | LPP | 1.000 | .620 | .695 | .637 |
| | ITU | .620 | 1.000 | .596 | .546 |
| | ITA | .695 | .596 | 1.000 | .565 |
| | INV | .637 | .546 | .565 | 1.000 |
| **Sig. (1-tailed)** | LPP | . | .000 | .000 | .000 |
| | ITU | .000 | . | .000 | .000 |
| | ITA | .000 | .000 | . | .000 |
| | INV | .000 | .000 | .000 | . |
| **N** | LPP | 1,160 | 1,160 | 1,160 | 1,160 |
| | ITU | 1,160 | 1,160 | 1,160 | 1,160 |
| | ITA | 1,160 | 1,160 | 1,160 | 1,160 |
| | INV | 1,160 | 1,160 | 1,160 | 1,160 |

Table 6 implies that there is a positive strong correlation between the variables to learning process performance. The increase in ITU shows an increase in LPP which means the more IT used in the hybrid learning process, the better the learning process performance, and the effect is strong. Likewise, the higher the IT adoption, the better the hybrid learning process performance, and the effect is strong. Moreover, the innovation capabilities have a positive strong correlation to LPP and, therefore, the better the innovation capabilities, the better the learning process performance.

**Table 7. Tests of Between-Subjects Effects**

**Dependent Variable:**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power |
|---|---|---|---|---|---|---|---|---|
| Corrected Model | 4,688.440[a] | 318 | 14.744 | 11.519 | 0.000 | 0.813 | 3,663.046 | 1.000 |
| Intercept | 6,118.569 | 1 | 6,118.569 | 4,780.395 | 0.000 | 0.850 | 4,780.395 | 1.000 |
| ITU | 72.686 | 16 | 4.543 | 3.549 | 0.000 | 0.063 | 56.789 | 1.000 |
| ITA | 283.773 | 12 | 23.648 | 18.476 | 0.000 | 0.209 | 221.710 | 1.000 |
| INV | 177.431 | 6 | 29.572 | 23.104 | 0.000 | 0.142 | 138.626 | 1.000 |
| ITU * ITA | 329.666 | 92 | 3.583 | 2.800 | 0.000 | 0.234 | 257.566 | 1.000 |
| ITU * INV | 140.363 | 48 | 2.924 | 2.285 | 0.000 | 0.115 | 109.665 | 1.000 |
| ITA * INV | 130.784 | 36 | 3.633 | 2.838 | 0.000 | 0.108 | 102.181 | 1.000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ITU * ITA * INV | 212.055 | 90 | 2.356 | 1.841 | 0.000 | 0.165 | 165.677 | 1.000 |
| Error | 1,076.421 | 841 | 1.280 | | | | | |
| Total | 103,341.000 | 1,160 | | | | | | |
| Corrected Total | 5,764.861 | 1,159 | | | | | | |

a. R Squared = .813 (Adjusted R Squared = .743)

b. Computed using alpha = .05

Evident in Table 7, the result shows that all tested hypotheses in this research are significant, with a *p* value of 0.000. Therefore, this research finds a significant influence between IT usage to learning process performance, and therefore the first hypothesis is accepted.

Likewise, the relationship between IT adoption and learning process performance is significant, with a *p* value of 0.000 less than 0.05. Thus, the second hypothesis is valid.

Moreover, the result shows a *p* value of 0.000 < 0.05 for the relationship between innovation capabilities and learning process performance, and therefore the third hypothesis is accepted.

Finally, the *p* value of 0.000 < 0.05 is obtained for the relationship between the interaction between the variables of IT usage, IT adoption, and innovation capabilities to learning process performance. Hence, this research found that the interaction between the applications of IT, adoption of IT, and innovation capabilities significantly influences the hybrid learning process performance.

**Table 8. Interaction Test Result**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .774[a] | .600 | .599 | 1.413 | .600 | 577.584 | 3 | 1,156 | .000 | 1.971 |

a. Predictors: (Constant), INV, ITU, ITA

b. Dependent Variable: LPP

Table 8 shows a value of adjusted R Square of 0.599, reflecting that the variables used in this research represent 60% of the learning process performance.

**Table 9. Linear Regression Result**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | 2.113 | 0.176 | | 12.007 | 0 | 1.768 | 2.459 |
| | ITU | 0.142 | 0.015 | 0.225 | 9.219 | 0 | 0.111 | 0.172 |
| | ITA | 0.345 | 0.022 | 0.397 | 16.005 | 0 | 0.303 | 0.387 |
| | INV | 0.472 | 0.039 | 0.29 | 12.199 | 0 | 0.396 | 0.547 |

a. Dependent Variable: LPP

From the result in table 9, the mathematical model of this research can be written as:

$$LPP = 0.225*ITU + 0.397*ITA + 0.29*INV$$

The structural equation modeling shows that IT adoption holds the most significant beta coefficient value of 0.397 compared to IT usage and innovation capabilities. The next most substantial value affecting the learning process performance is innovation capabilities with a beta coefficient value of 0.29, followed by IT usage with a coefficient value of 0.225. Thus, this research found that educational institutions should focus on IT adoption first, then innovation capabilities and IT usage. The statement reflects the idea that educational institutions should ensure that the current IT tools have been adopted and mastered before implementing other innovations and newer IT tools.

**4.2 Discussion**

The findings show that IT adoption has the most substantial effect on learning process performance from the theoretical perspective. This result can be explained using the TAM theory by Davis (2014), which states how technology users receive and use technology based on belief, attitude, intention, and user behavior relationship.

There is a clear relationship between the college and students in this research. By following all the requirements to join the hybrid learning process, the students' beliefs, attitudes, and intentions prove the TAM model correctly. Likewise, the student's perception of the usefulness and ease of use of IT technology supports IT adoption and IT usage. Due to the complexity of the hybrid learning process, the students need to experience the benefits of hybrid learning before the technology is adopted and used (Loureiro et al., 2020; Scherer et al., 2019; Yoon & Kim, 2017).

This research found a significant direct relationship between IT usage and learning process performance (LPP) with a beta coefficient value of 0.225. This result strengthened the previous study by Yoshikuni and Albertin (2015), which found a direct impact of IT utilization on performance. Likewise, the result confirms that IT usage is one of the most critical aspects of performance (Chan et al., 1997; Ju et al., 2013; Bharadwaj (2000).

Furthermore, before IT usage, IT adoption has been a great challenge for the organizations as they must allocate a high investment in adopting IT. Meanwhile, IT investments are easily replicated by the competitors, reflecting the need for the organization to adopt technology and develop the IT resources into something unique and practical (Clemons, 1986; Clemons & Row, 1991; Mata et al., 1995). Related to this research, nearly all educational institutions adopted the technology at the beginning of the COVID-19 pandemic from the lowest to the highest level. This is very important as it also shows the biggest significant effect on the relationship between IT adoption and learning process performance. IT tools such as websites, learning management systems (LMS), Zoom video conferencing tools, cameras, and audio tools, which can easily be bought online. IT adoption will be the most crucial step in making the hybrid learning process works.

However, there will not be substantial differences between the previous learning process performance and the recent one without the proper IT usage. In this research, the IT usage has been evident as all the learning experiences are entirely integrated with IT usage. For example, the LMS does not stand alone; the LMS integrates the Zoom conferencing link and other devices into the system. When the learning begins, the lecturers and students need to log in to the LMS, where everything is well integrated. The lecturers and students can start the learning process by only clicking once. The supporting devices such as audio tools, TVs, and cameras have previously been connected to the LMS and can be controlled easily during the learning process. With such IT usage, the learning process becomes effective and not time-consuming for the users, even new beginners.

This result supports the previous study by Chen and Chiou (2014) which shows that students in hybrid courses had much greater performance scores and satisfaction than students in face-to-face classes, according to the findings. These findings could be explained by the fact that online learning was more convenient to utilize and increased students' enthusiasm to learn.

Moreover, the ability to develop IT adoption to unique IT usage requires the innovation capabilities that represent the user demands and technological possibilities that must be considered during the development process. The successful innovation reflects the ability of the educational institution to surpass the other competitors (den Hertog et al., 2010), which in this research refers to better learning process performance. The IT adoption based on the TAM model is greatly affected by the perceived usefulness (PU) and perceived ease of use (PEOU) of using the hybrid learning technology (Schepers & Wetzels, 2007; Scherer et al., 2019; Venkatesh & Bala, 2008), which implies that the willingness of the educational institutions to adopt hybrid learning technology depends on how they assume the performance after implementing the technology, and the efforts needed to implement the technology.

Thus, the findings of this research posit that the implementation of hybrid learning needs to focus on IT adoption first to ensure that the educational institutions have the adequate resources to conduct the hybrid learning. Next, the institutions need to use their innovation capabilities to find new ways, new ideas, or even modify existing methods to develop the IT adoption into unique IT usage.

Olapiriyakul and Scher(2006) revealed that there was no significant difference in performance between students who took a hybrid course and those who did the same course via distant learning. Students provided some good feedback on the perceived value of the hybrid course instructor and course resources. The learning styles of the students were also investigated. They found that most students in the hybrid learning course are active, sensory, sequential, and visual learners. Visual presentations were chosen above verbal explanations by most of them. Hence, when done correctly, this will increase the learning process performance during the hybrid learning process.

As explained previously, the learning process performance has become the central focus of this paper. The physical distancing and movement restrictions have made it impossible for the institutions to obtain reliable and valid results of students' evaluations. Therefore, learning process performance will be the most significant performance differentiator for successful hybrid learning performance.

## 5. Conclusion

Based on the findings, this research concluded that the performance of the hybrid learning process is greatly dependent on IT adoption, innovation capabilities, and IT usage. These three variables significantly increase the hybrid learning process performance and must be taken seriously. With the most substantial value in IT adoption, this research reflects the educational institutions need to conduct hybrid learning to ensure IT adoption and mastery before executing innovation capabilities and IT usage.

Theoretically, this research will enrich the theory by evaluating knowledge centered on one particular learning method. The study will also enrich the TAM (technology acceptance model) theory introduced by Fred Davis in 1985 (Davis, 1989; Venkatesh & Davis, 2009). Practically speaking, this research will benefit the managerial team of educational institutions to evaluate the effectiveness and performance of the limited face-to-face learning process with hybrid learning methods and high-end technology integration that is already underway.

This study has provided an overview of the limited face-to-face learning conditions that have been ongoing and provided recommendations for improving the following learning process. This research further enhanced the quality of the learning process, which will eventually improve the quality of graduates or students to implement the knowledge obtained during a lecture in the lecture community. It is expected that this research may improve the quality of learning processes in the education sector in Indonesia. This research is fundamental because hybrid learning will not end anytime soon and needs quick action to immediately accelerate the adaptation process for a more quality learning process.

However, this research has some limitations. First, information technology usage and adoption are costly for most educational institutions. Therefore, this research might only be applicable to the educational institutions that have enough funds to implement the technology. Second, the research data were taken from a four month period but a more robust result may be found with a longer period.

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