

## Research Article

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## Advancing Curriculum and Instruction Course Model through Information Communication Technology towards Students' Learning Goals Completion: Motivation, Perspectives and Outcomes

Zainal Arifin , Budi Setiawan

**Abstract**

**Background/purpose.** This study examines the evolution of information technology-driven learning models aligned with the policies and programs outlined in the strategic plan of the Universitas Pendidikan Indonesia (UPI) aimed at becoming a leading institution. This includes the advancement of information and communication technology-based learning, supported by infrastructure established on the UPI campus since 2006.

**Materials/methods.** This research employs a research and development (R&D) methodology, utilizing three specific methods: descriptive, evaluative, and experimental. The experimental design employed will be the Pretest-Posttest Control Group Design.

**Results.** The research findings indicate that this information technology-driven learning model facilitates the teaching process for both lecturers and students in the Curriculum and Instruction domain. It enhances student engagement, enthusiasm, and motivation, as the lecture experience becomes more diverse and engaging. Students are afforded the opportunity to exercise creativity and innovation, ultimately leading to improved academic performance. Utilizing the intended learning model, lecturers exhibit a pronounced inclination to establish a hospitable and successful learning process, reflecting a paradigm shift from conventional education to information technology-based learning. Secondly, lecturers are a critical aspect in enhancing student learning results. This is substantiated by empirical evidence indicating that "what students learn is significantly shaped by the instructional methods employed by their lecturers". Thirdly, Curriculum and Instruction is a mandatory course for all students enrolled in the education program in UPI.

**Conclusion.** Consequently, this course must be executed accurately and in compliance with the process criteria established by the government. This concept is anticipated to be employed by instructors to enhance student learning results.

## 1. Introduction

Universitas Pendidikan Indonesia (UPI), as a leading educational and teacher training institution (LPTK) in Indonesia, has conducted and will continue to conduct various studies on its education system, including on the curriculum. The last study conducted by UPI was in April 2010, when it held the International Conference on Teacher Education on Redesigning Professional Teacher Education. The conference reviewed various thoughts of teacher education experts from the United States, Australia, Europe, Hong Kong, and experiences conducted in China, Japan, Korea, and Indonesia. The results of the conference were finally made into the Decree of the Academic Senate of Universitas Pendidikan Indonesia Number 005/Senat.Akd./UPI-SK/X/2010 on Redesigning Professional Teacher Education.

In accordance with the vision, mission, and objectives of the Indonesian Education University, as well as the implications of the provisions of the UPI Academic Senate, every teacher education student is required to take all Basic Professional Courses in semester 3 (three) or 4 (four) because it is a requirement to continue to the next course. The results of a preliminary study of the learning process (read: lectures) in the course of- Curriculum and Instruction at the Indonesian Education University showed that the motivation and enthusiasm for learning of students in the learning process were still weak, so that the results of student learning in terms of knowledge were still considered less solid and convincing. The phenomena include (a) students' attention is often not focused, (b) many students arrive late outside the provisions that have been agreed upon together, and (c) there are students who sleep. There are many factors behind this, including low student interest in studying the course, lack of learning motivation, and it is strongly suspected that students' perceptions of the course are not good (considering the course is only a complement or additional). For students, the important thing is to pass the course with high marks.

In addition, it often happens that the number of students who take the curriculum and instruction course for each classroom exceeds the limit (overload). The number of students can reach 60 or even 80 people per class. Conditions like this make it difficult for lecturers to develop a conducive and effective learning process. Lecturers also often carry out monotonous activities (coming, sitting, discussing, closing), so that students become bored, lazy and fed up. The application of learning methodology seems to be only teaching to pass the exam (teaching to test), while the demands for developing student competencies as a whole tend to be neglected. In fact, there are demands for the learning process in each educational unit to be in accordance with process standards, namely "... held interactively, inspiringly, pleasantly, challengingly, motivating students to participate actively, and providing sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students" (PP.19/2005 concerning National Education Standards) Chapter IV, Article 19, paragraph (1).

One of the efforts to overcome the various problems above, it is necessary to develop a practical, appropriate learning model, and in accordance with the current development of science and technology, including the demands of lecturer competency and the characteristics of teacher education students at the Indonesian Education University, namely the Information Technology-Based Learning Model. This model is in accordance with the competency demands as stated in the "21st Century Partnership Learning Framework", in BSNP (2010), that the competencies that must be possessed by Human Resources in the 21st century, namely "critical-thinking and problem-solving skills, communication and collaboration skills, creativity and innovation skills, information and communications technology literacy, contextual learning skills, and information and media literacy skills". It was emphasized again by the National Education Standards Agency (2010) that "the skills that will stand out in the 21st century are connectivity skills, where science is increasingly narrowing, specific, and integrated and even producing hybrids". The development of this learning model is also in line with one of the policies and programs set out in the strategic plan (renstra) of the Indonesian

Education University for 2011-2015, namely "development of information and communication technology-based learning" (information communication and technology), the infrastructure of which has been built on the UPI campus since 2006.

This information technology-based learning model is expected to make it easier for lecturers and students to carry out the course of- Curriculum and Instruction lectures, even students will be more interested, enthusiastic and motivated to follow lectures well, because the lecture process becomes more varied and not boring, students are given the freedom to be creative and innovative so that in turn it can improve student learning outcomes. To use the learning model in question, there must be a strong desire (interest and motivation) of lecturers to build a conducive and effective learning process.

In practice, students can use information technology in three forms, namely: First, utilizing computers as a learning tool known as computer-assisted instructional (CAI). Here, students can upload learning materials or carry out other learning activities with the help of computer devices. Second, distributing learning materials through the internet network that can be packaged in the form of webpages. The material is placed on a server connected to the internet, so that it can be retrieved by students using a web browser or file transfer protocol (file sending application). Third, utilizing communication media with experts or resource persons, so that students can ask about material that is not well understood. Thus, students get feedback from experts or fellow students.

This study analyzes the progression of information technology-based learning models in accordance with the policies and initiatives specified in the strategic plan of Universitas Pendidikan Indonesia (UPI) to establish itself as a premier university. It is crucial as it encompasses the progression of information and communication technology-based education, underpinned by infrastructure developed on the UPI campus since 2006. It also covers this following research question to be exposed regarding to what extent does the information technology-based learning model within the Educational Foundation Course-Curriculum and Instruction enhance student learning outcomes at Universitas Pendidikan Indonesia consisting of; preliminary study results, limited trial results, larger trial results, and comparison results of experiment groups.

## **2. Literature Review**

### ***2.1. Information Communication Technology and Education***

It is essential to highlight that teachers are the main element of educational changes with ICT, and for that, they must receive adequate training in their initial education (Valtonen et al., 2015); therefore, in the context of ITE, it is expected that teacher trainers act as a role model for future teachers, in the sense of demonstrating how relevant and accessible it is to undertake ICT mediated teaching and learning processes (Tondeur et al., 2019). Likewise, these same teacher trainers should be able to provide their students with sufficient knowledge that allows them to autonomously develop a pedagogical use of technologies in the classroom context (Luik & Taimalu, 2021). For the practical success of ICT integration in ITE (Burrows et al., 2021), it is recommended to establish collaborative work between teacher trainers and students so that teacher trainers encourage future teachers to explore pedagogical processes with ICT according to their training area.

At the same time, research in the area has shown that the higher education teacher educators involved in ICT indicate that they have positive perceptions about the potential of ICT to support teaching and learning processes and that they are favourable to its educational use (Kulaksiz & Toran, 2022; Simoes & Faustino, 2019; Valtonen et al., 2015). The literature indicates that one of the weaknesses of ICT in Indonesia is the insufficient number of hours dedicated to supervised professional practice (SPP, or internship) in master's degrees in teaching, a formative space particularly relevant for the educational exploitation of ICT in a real-world scenario. According to

Craveiro (Craveiro, 2016), such a few hours are not enough to guarantee future teachers a minimum experience to face the reality of the classroom when entering the teaching career. According to Folque (2018), complements the idea by stating that the SPP has in the master's degrees in teaching a weight of 23% and that, as a rule, it is primarily allocated to the end of the ICT, signalling that such condition generates contestation about the priority given to theoretical learning compared to the teaching practice. However, the lack of consensus on the number of hours devoted to SPP is not only found in ICT in Indonesia but also part of the inequalities found in this field in European ICT. Although SPP is compulsory in all BD signatory countries, its duration varies greatly (Yang et al., 2015). Another critical factor related to the presence of ICT in the SPP is pointed out that internship centres (i.e., schools) are currently inhibitors of digital-mediated pedagogical practices for future teachers because these institutions do not have sufficient technological resources and proper infrastructures (Graca, 2021).

## **2.2. Computer Assisted Instructional**

Technology can help this modern approach to learning, but learning skills and subjective well-being need to be given more attention (Pedaste & Leijen, 2018). The major goals of curriculum-based learning facilitation for students are to equip them with the skills necessary to meet the challenges of the twenty-first century, which includes encouraging lifelong learning, using cutting-edge technologies, and developing 21st century abilities. According to Gosper & Ifenthaler (2014), these adjustments necessitate the creation of new curriculum models that adapt to the varied needs of students and get graduates ready for the workforce. The focus of this Century is on individuals' skills and attitudes that are aligned with the demands of the twenty-first century. Therefore, to address the goals of students' learning in developing the 4Cs competency, it is essential to implement effective teaching activities and provide supportive educational materials.

The utilization of mobile devices has the potential to transform the conventional classroom into new learning environments (Chen et al., 2015; Davydovskaia et al., 2021). As an illustration, the Engaged Active Student Learning space (EASL) is a novel educational setting that reaps some advantages from the utilization of mobile devices when it comes to education. The classroom for English as a Second Language (ESL) is planned and organized in a way that encourages active learning in a scholastic setting (Cardullo et al., 2015). In point of fact, not only are the rooms and their use designed to stimulate student-to-student connection, but they are also built to allow students to bring their own mobile devices while they are there.

On a continuum that extends from general to specialized, the domain of learning objectives can be described as follows (Conklin et al., 2005). When it comes to the technology that is being utilized in the classroom, the utilization of the technology is not the purpose; rather, it is serving as a means to accomplish other objectives that have been mentioned. The more precise "Instructional Objectives" category is where mobile devices and the apps that are related with them are placed when they are regarded along the continuum. The teacher is the one who initiates instructional lesson plans for the purpose of learning how to operate the mobile device and understanding how to use the applications that are available on the device. On the other hand, due to the existence of a spectrum, the specialized "Instructional Objectives" provide support for the more general "Educational" and "Global" objectives.

The use of mobile devices in the classroom is not sufficient on its own; it is incomplete without the application of suitable software. The functioning of apps is very precise, and as a result, it is simple to divide them up into different learning activities. According to Yang, Li, and Lu (2015), the utilisation of mobile applications provides an increased opportunity for the development of "micro-learning" activities within the classroom setting. The utilization of mobile devices affords the possibility of collaboration as well (Liu et al., 2003). The student will benefit from an active learning environment

that is created by combining the mobile device and the apps that are associated with it with the possibility of engaging in "micro-learning" activities and working together (Lindquist et al., 2007).

The use of mobile devices is gaining popularity in academic settings, and it has been demonstrated that students can benefit from using these devices (Evans & Johri, 2008). In part because of its widespread use, widespread popularity, and the availability of a wide variety of apps that are pertinent to the topic at hand, the incorporation of mobile technology into the classroom has enormous potential (Governo da República Portuguesa, 1986; Yang et al., 2015). Furthermore, the utilization of mobile technology has the potential to positively motivate young people to learn, maintain their interest, and ultimately improve their learning objectives (Attewell, 2005; Liu et al., 2003). In point of fact, a survey conducted by Pearson in 2014 came to the conclusion that the majority of students now anticipate permitting the use of mobile devices in the classroom (Smith, 2014).

### 3. Methodology

#### 3.1. Research Approach

This study will employ a quantitative approach grounded in positivist philosophy, so it is frequently referred to as a positivistic strategy, based on the primary topic, research objectives, and data types to be collected. This study will employ the research and development technique. Three methods will be employed: descriptive, evaluative, and experimental methods. The employed experimental design will be the Pretest-Posttest Control Group Design. The R & D steps used are as follows.

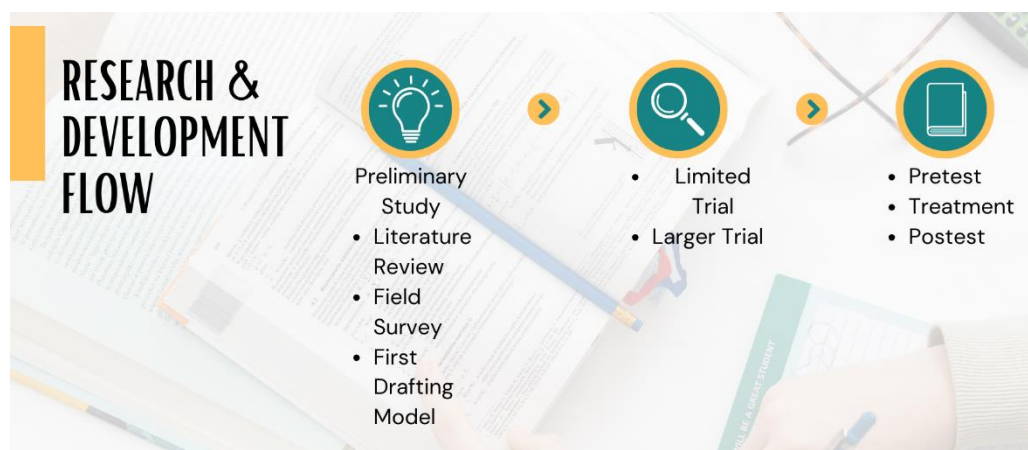


Figure 1. Research and Development Process

#### 3.2. Research Participants and Data Collection

The study population comprised; (1) all students enrolled in the education study program who undertook the course of -Curriculum and Instruction in the fourth semester at the main campus of the Universitas Pendidikan Indonesia. The students' sample were modified to align with the research phases: preliminary study, model development, and validation testing comprising 106 individuals coming from the 3 different study programs namely; Elementary school teacher education (37 students), Citizenship study program (38 students) and Local language study program (31 students). This research employed a test as the data collection technique to assess participants' knowledge. It generally consists of a series of questions, problems, or tasks aimed at eliciting specific responses.

#### 3.3. Data Analysis

Data analysis in research and development is the methodical collection, processing, and interpretation of data to extract significant insights that propel innovation and inform decision-

making. This study will employ data gathering techniques including questionnaires, documentation analysis, observations, interviews, and assessments of learning outcomes. Data analysis during the effectiveness testing phase employed percentages and chi-square tests, whereas the model creation and validation phases utilized t-tests, facilitated by SPSS version 20.0. It employs test in term of objective form as the instrument to collect the data. This exam serves as a data gathering tool that evaluates learners' knowledge, skills, or abilities through 25 questions, each with five distinct answer alternatives. The tests are evaluated according to standardized protocols, minimizing the potential for subjective assessment by the evaluator. It is frequently employed in quantitative research to gather data regarding participants' academic performance, cognitive skills, or certain domains of knowledge. The results are generally subjected to statistical analysis to ascertain trends, connections, or effects of interventions.

## 4. Results

### 4.1. Preliminary Study Results

Lecturers' evaluations of the Curriculum and Instruction process at Universitas Pendidikan Indonesia are generally favorable. The observed factors encompass student attendance, the appropriateness of the Curriculum and Instruction materials according to the competences of potential teachers, the utilization of information technology, lecturer credentials, student engagement, learning challenges, and the evaluation system.

Students' impressions of the course- Curriculum and Instruction process at the Universitas Pendidikan Indonesia are generally positive. The observed aspects encompass the presence of instructors, instructional materials, instructor engagement, educational resources, instructor presentation, learning activities, educational environment, time management, learning challenges, and evaluation systems. A majority (68.52%) of students' learning motivation in the course of- Curriculum and Instruction at the Indonesian Education University is poor, while only a minor segment (22.22%) is classified as "high," and an even smaller segment is deemed "moderate." Based on the category, over half (40.74%) is classified as "low," almost half (27.78%) as "very low," a minor segment (18.52%) as "moderate," a little fraction (09.26%) as "high," and a minimal percentage (03.70%) as "very high."



**Figure 2.** Students' Preliminary Study Impression

The state of learning facilities and infrastructure in the Curriculum and Instruction program at Universitas Pendidikan Indonesia is satisfactory, including classrooms, faculty desks and chairs, student seating, whiteboards, lighting, ventilation, electricity, wall paint, and the departmental library. Concerning the qualifications of lecturers enrolled in the Curriculum and Instruction course, the data indicates that there are 4 Professors, 12 Doctors in Curriculum Development, 4 Doctors in Non-Curriculum Development, 12 Masters in Curriculum Development, and 8 Masters in Non-Curriculum Development. This circumstance demonstrates that the quantity and qualifications of professors are commendable.



**Figure 3.** Students' Preliminary Learning Facilities

Prior to the research, the average student learning outcomes in the Curriculum and Instruction course were 3.27, indicating a satisfactory level of performance. The average scores and corresponding percentages of student learning outcomes for each faculty, ranked accordingly, are as follows: (a) FPTK (Faculty of Vocational Engineering Education) = 3.53 (A = 16 = 53.33% and B = 14 = 46.67%), (b) FPMIPA (Faculty of Natural Science Education) = 3.4 (A = 12 = 40% and B = 18 = 60%), (c) FIP (Faculty of Educational Science) = 3.3 (A = 9 = 30% and B = 21 = 70%), (d) FPIPS (Faculty of Social Science Education) = 3.2 (A = 6 = 20% and B = 24 = 80%), (e) FPOK (Faculty of Sport Education) = 3.13 (A = 4 = 13.33% and B = 26 = 86.67%), and (f) FPBS (Faculty of Language and Literature Education) = 3.1 (A = 3 = 10% and B = 27 = 90%). Prior to the investigation, students held favorable attitudes regarding the utilization of information technology in the Curriculum and Instruction course. The observed elements encompass the advantages of information technology, its various forms, and the inclination towards its utilization.

#### **4.2 Limited Trial Results**

Prior to executing a limited trial, a preliminary draft of the information technology-based learning model is initially developed as follows:

In this phase, each lecturer is required to create a syllabus for the course of- Curriculum and Instruction according to the specified framework:

| <b>COURSE SYLLABUS</b>                              |                                           |                             |
|-----------------------------------------------------|-------------------------------------------|-----------------------------|
| <b>I. COURSE IDENTITY :</b>                         |                                           |                             |
| Course                                              | : Curriculum and Instruction              |                             |
| Course Code                                         | : KD.303                                  |                             |
| Credits                                             | : 3 (three)                               |                             |
| Semester                                            | : 3 / 4                                   |                             |
| Course Group                                        | : Educational Foundation Course           |                             |
| Program                                             | : Educational based Undergraduate Program |                             |
| Lecturer                                            | : Lecturers' Team                         |                             |
| <b>II. BASIC COMPETENCE</b>                         |                                           |                             |
| <b>III. CONTENT DESCRIPTION</b>                     |                                           |                             |
| <b>IV. LEARNING MODEL</b>                           |                                           |                             |
| <b>V. RINCIAN MATERI PERKULIAHAN TIAP PERTEMUAN</b> |                                           |                             |
| <b>Meeting...</b>                                   | <b>Topic and Theme</b>                    | <b>Media and References</b> |
| 1                                                   |                                           |                             |
| 2                                                   |                                           |                             |
| 3                                                   |                                           |                             |
| 4                                                   |                                           |                             |
| 5                                                   |                                           |                             |
| 6                                                   |                                           |                             |
| 7                                                   |                                           |                             |
| 8                                                   |                                           |                             |
| 9                                                   |                                           |                             |
| 10                                                  |                                           |                             |
| 11                                                  |                                           |                             |
| 12                                                  |                                           |                             |
| 13                                                  |                                           |                             |
| 14                                                  |                                           |                             |
| 15                                                  |                                           |                             |
| 16                                                  |                                           |                             |
| <b>VI. EVALUATION</b>                               |                                           |                             |
| <b>VII. BIBLIOGRAPHY</b>                            |                                           |                             |

Figure 4. Course Framework

According to the syllabus, the lecturer then develops a Lecture Unit (SAP) for each lecture session in the format of a .doc file, adhering to the following structure:

| <b>LECTURE UNIT</b>                 |         |
|-------------------------------------|---------|
| Course                              | : ..... |
| Course Code                         | : ..... |
| Semester/ credit                    | : ..... |
| Topic/ Theme                        | : ..... |
| Program                             | : ..... |
| Meeting                             | : ..... |
| Lecturer/ Assistant                 | : ..... |
| I. Basic Competence                 |         |
| II. Achieved Learning Goals Aspects |         |
| III. Indicator                      |         |
| IV. Learning Material               |         |
| V. Learning Activities              |         |
| VI. Media and Learning Resources    |         |
| VII. Evaluation                     |         |

Figure 5. Lecture Unit

### 4.3. The Results of Pre-Test and Post-Test Limited Trial

**Table 1.** Results of the First Limited Trial Pretest and Posttest

| Data Analysis Aspect  | Pretest | Posttest | Gain |
|-----------------------|---------|----------|------|
| Total Score (N = 39)  | 125     | 302      | 177  |
| Average ( $\bar{X}$ ) | 3,21    | 7,74     | 4,53 |

**Table 2.** Results of the Second Limited Trial Pretest and Posttest

| Data Analysis Aspect  | Pretest | Posttest | Gain |
|-----------------------|---------|----------|------|
| Total Score (N = 39)  | 142     | 302      | 160  |
| Average ( $\bar{X}$ ) | 3,64    | 7,74     | 4,1  |

**Table 3.** Results of the Third Limited Trial Pretest and Posttest

| Data Analysis Aspect  | Pretest | Posttest | Gain |
|-----------------------|---------|----------|------|
| Total Score (N = 39)  | 159     | 316      | 157  |
| Average ( $\bar{X}$ ) | 4,08    | 8,10     | 4,02 |

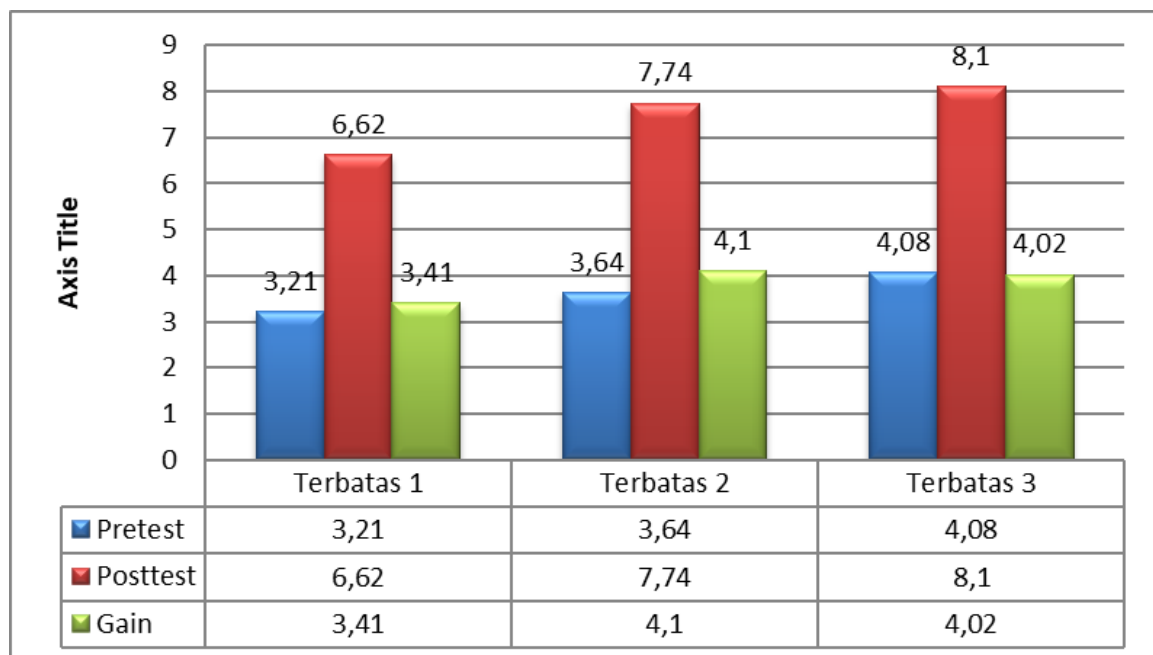


**Figure 6.** Comparison of Average Learning Outcomes in Limited Trials

4.4. Larger Trial Results

Table 4. Average Pretest and Posttest Scores of the First Larger Trial

| Study Program                                | Learning Result | Pretest | Posttest | Gain |
|----------------------------------------------|-----------------|---------|----------|------|
| PGSD-D (Elementary School Teacher Education) | Total Score     | 106     | 254      | 148  |
|                                              | Average         | 2,86    | 6,86     | 4    |
| PKn (Citizenship Education)-B                | Total Score     | 114     | 287      | 173  |
|                                              | Average         | 3,0     | 7,55     | 4,55 |
| Bahasa Daerah (Local Language)-B             | Total Score     | 89      | 202      | 113  |
|                                              | Average         | 2,87    | 6,52     | 3,65 |

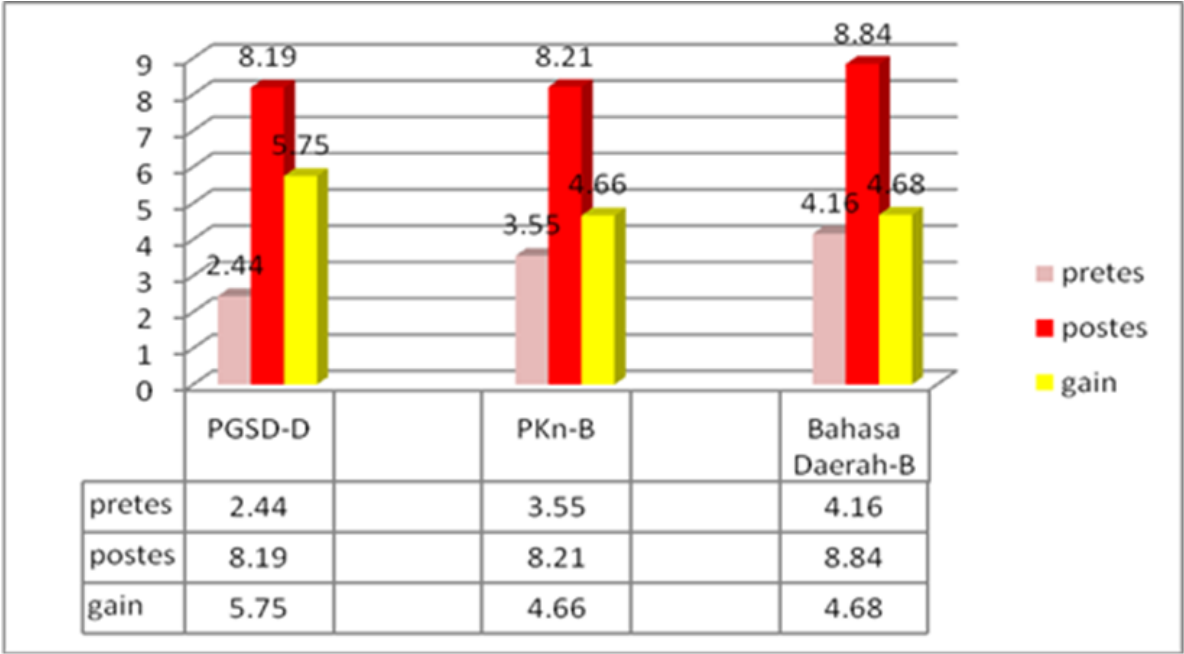


Figure 7. Average Pretest and Posttest Scores of the First Larger Trial

**Table 5.** Average Pretest and Posttest Scores of the Second Larger Trial

| Study Program                                         | Learning Result | Pretest | Posttest | Gain |
|-------------------------------------------------------|-----------------|---------|----------|------|
| PGSD-D<br>(Elementary<br>School Teacher<br>Education) | Total Score     | 140     | 270      | 130  |
|                                                       | Average         | 3,78    | 7,30     | 3,52 |
| PKn (Citizenship<br>Education)-B                      | Total Score     | 121     | 311      | 190  |
|                                                       | Average         | 3,18    | 8,18     | 5    |
| Bahasa Daerah<br>(Local<br>Language-B)                | Total Score     | 119     | 244      | 125  |
|                                                       | Average         | 3,84    | 7,87     | 4,03 |

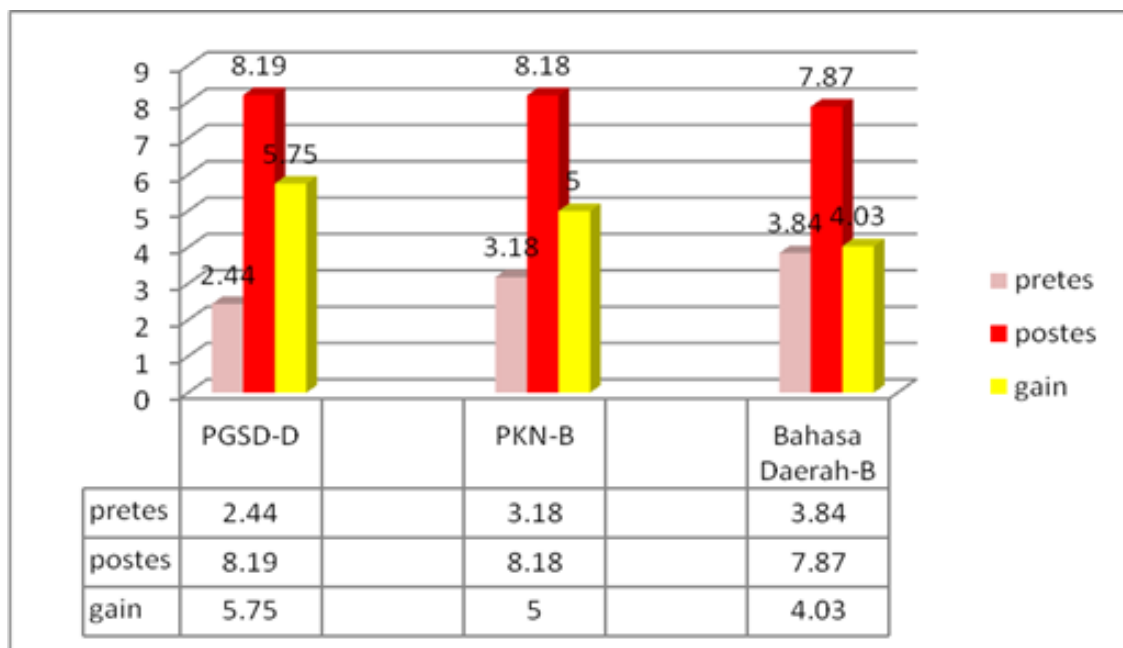
**Figure 8.** Average Pretest and Posttest Scores of the Second Largest Trial

**Table 6.** Average Pretest and Posttest Scores of the Third-Largest Trial

| Study Program                                         | Learning Result | Pretest | Posttest | Gain |
|-------------------------------------------------------|-----------------|---------|----------|------|
| PGSD-D<br>(Elementary<br>School Teacher<br>Education) | Total Score     | 144     | 303      | 159  |
|                                                       | Average         | 2,44    | 8,19     | 5,75 |
| PKn<br>(Citizenship<br>Education)-B                   | Total Score     | 135     | 312      | 177  |
|                                                       | Average         | 3,55    | 8,21     | 4,66 |
| Bahasa Daerah<br>(Local<br>Language-B)                | Total Score     | 129     | 274      | 145  |
|                                                       | Average         | 4,16    | 8,84     | 4,68 |

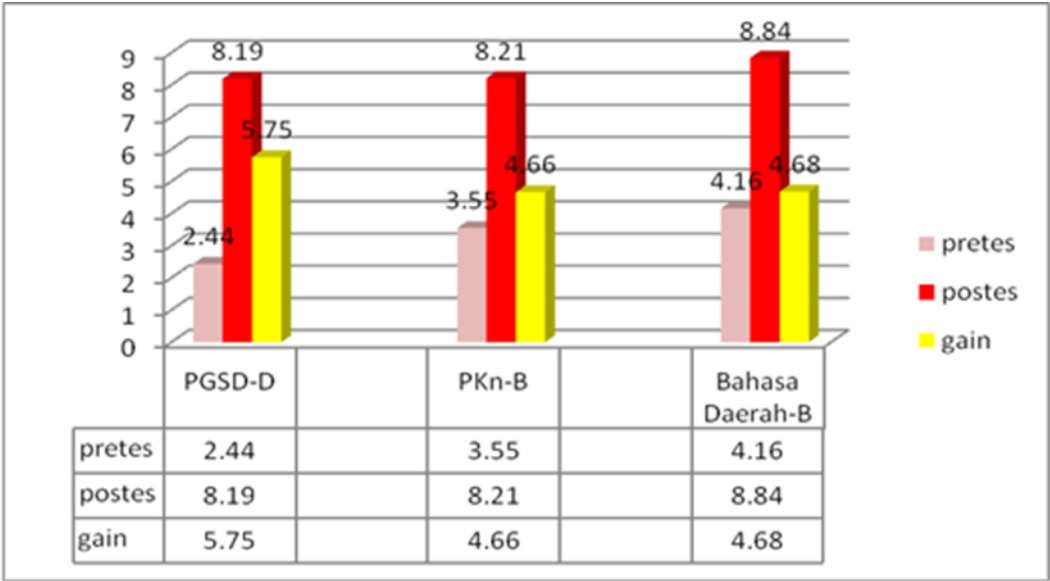


**Figure 9.** Average Pretest and Posttest Scores of the Third-Largest Trial

**4.4. Comparison Results of Experiment Groups**

**Table 7.** Comparison of Pretest and Posttest in Experimental Group

| Study Program                           | <i>Levene<br/>Statistic</i> | <i>Sig</i> | Note        | t-count | <i>df</i> | <i>Sig.<br/>(2-tailed)</i> |
|-----------------------------------------|-----------------------------|------------|-------------|---------|-----------|----------------------------|
| PGSD-C                                  | 0.569                       | 0.453      | Homogeneous | 25.210  | 74        | 0.000                      |
| Geography-B<br>Indonesian<br>Language-A | 0.233                       | 0.631      | Homogeneous | 16.917  | 76        | 0.000                      |
|                                         | 0.623                       | 0.433      | Homogeneous | 13.617  | 66        | 0.000                      |
| Chemistry-A                             | 1.514                       | 0.223      | Homogeneous | 16.362  | 64        | 0.000                      |

Table 7 above indicates a disparity between the pretest and posttest results in the experimental group, encompassing the PGSD-C study program, the Geography-B study program, the Indonesian Language-A study program, and the Chemistry-A study program. The result is that students' learning outcomes in the Curriculum and Instruction course have greatly improved, as evidenced by comparing pretest and posttest scores in the experimental group.

**Table 8.** Comparison of Pretest and Posttest in Control Group

| Study Program            | <i>Levene<br/>Statistic</i> | <i>Sig</i> | Note        | t-count | <i>df</i> | <i>Sig.<br/>(2-tailed)</i> |
|--------------------------|-----------------------------|------------|-------------|---------|-----------|----------------------------|
| PGSD-B                   | 0.446                       | 0.506      | Homogeneous | 14.243  | 68        | 0.000                      |
| Geography-B              | 1.475                       | 0.229      | Homogeneous | 5.777   | 64        | 0.000                      |
| Indonesian<br>Language-A | 1.205                       | 0.277      | Homogeneous | 14.820  | 62        | 0.000                      |
| Chemistry-A              | 0.925                       | 0.339      | Homogeneous | 16.732  | 72        | 0.000                      |

Table 8 demonstrates that there is a distinction between the pre-test and the post-test in the control group, which includes the PGSD-B study program, the Geography-A study program, the Regional Language-C study program, and the Chemistry-B study program. However, the difference is not statistically significant. As can be observed from the comparison between the score on the pre-test and the score on the post-test for the control group, the conclusion is that the learning outcomes of students who are enrolled in the Curriculum and Instruction course have greatly improved.

**Table 9.** Comparison of the Pretest of the Experimental Group with the Control Group

| Study Program                                    | <i>Levene<br/>Statistic</i> | <i>Sig</i> | Note        | t-count | <i>df</i> | <i>Sig.<br/>(2-tailed)</i> |
|--------------------------------------------------|-----------------------------|------------|-------------|---------|-----------|----------------------------|
| Experiment: PGSD-C<br>Control: PGSD-B            | 3.484                       | 0.066      | Homogeneous | 3.789   | 71        | 0.000                      |
| Experiment: Geo-B<br>Control: Geo-A              | 0.257                       | 0.614      | Homogeneous | 2.211   | 70        | 0.030                      |
| Experiment: Indo-A<br>Control : Daerah-C         | 0.039                       | 0.845      | Homogeneous | 2.634   | 64        | 0.011                      |
| Experiment: Chemistry-A<br>Control: Chemistry -B | 0.119                       | 0.731      | Homogeneous | 2.678   | 68        | 0.009                      |

The average pre-test scores for PGSD-C (ex) and PGSD-B (control), Geography-B (ex) and Geography-A (control), Indonesian-A (ex) and Regional Language-C (control), and Chemistry-A (ex) and Chemistry-B (control) differ, as shown in Table 9. This suggests that students' learning results in the course of Curriculum and Instruction have improved significantly, as evidenced by the comparison of the experimental group's pre-test scores to the control group.

**Table 10.** Comparison of Posttest of Experimental Group with Control Group

| Study Program                                    | <i>Levene<br/>Statistic</i> | <i>Sig</i> | Note        | t-<br>count | <i>df</i> | <i>Sig.<br/>(2-tailed)</i> |
|--------------------------------------------------|-----------------------------|------------|-------------|-------------|-----------|----------------------------|
| Experiment: PGSD-C<br>Control: PGSD-B            | 1.630                       | 0.206      | Homogeneous | 6.755       | 71        | 0.000                      |
| Experiment: Geo-B<br>Control: Geo-A              | 1.965                       | 0.165      | Homogeneous | 8.815       | 70        | 0.000                      |
| Experiment: Indo-A<br>Control : Daerah-C         | 0.766                       | 0.385      | Homogeneous | 2.670       | 64        | 0.010                      |
| Experiment: Chemistry-A<br>Control: Chemistry -B | 0.348                       | 0.557      | Homogeneous | 2.646       | 68        | 0.010                      |

Table 10 above illustrates that the average post-test scores differ for PGSD-C (ex) and PGSD-B (control), Geography-B (ex) and Geography-A (control), Indonesian-A (ex) and Regional Language-C (control), and Chemistry-A (ex) and Chemistry-B (control). This implies that the experimental and control groups' post-test scores have substantially improved student learning outcomes during the Curriculum and Instruction course. The post-test comparison results also demonstrate that the information technology-based learning model in the course of- Curriculum and Instruction is effective in enhancing student learning outcomes.

**Table 11.** Comparison of Gains of Experimental Group with Control Group

| Study Program                                    | <i>Levene<br/>Statistic</i> | <i>Sig</i> | Note        | t-<br>count | <i>df</i> | <i>Sig.<br/>(2-<br/>tailed)</i> |
|--------------------------------------------------|-----------------------------|------------|-------------|-------------|-----------|---------------------------------|
| Experiment: PGSD-C<br>Control : PGSD-B           | 2.142                       | 0.148      | Homogeneous | 5.305       | 70        | 0.000                           |
| Experiment: Geo-B<br>Control : Geo-A             | 0.311                       | 0.579      | Homogeneous | 9.219       | 70        | 0.000                           |
| Experiment: Indo-A<br>Control : Daerah-C         | 0.467                       | 0.497      | Homogeneous | 2.418       | 64        | 0.018                           |
| Experiment: Chemistry-A<br>Control: Chemistry -B | 0.062                       | 0.804      | Homogeneous | 2.631       | 68        | 0.011                           |

Table 11 above indicates disparities in gain between PGSD-C (experimental) and PGSD-B (control), Geography-B (experimental) and Geography-A (control), Indonesian-A (experimental) and Regional Language-C (control), as well as Chemistry-A (experimental) and Chemistry-B (control). This indicates that student learning outcomes in the Curriculum and Instruction course have markedly improved, as evidenced by the comparison of post-test scores between the experimental and control groups. The findings of this gain comparison indicate that the information technology-based learning approach in the Curriculum and Instruction course is beneficial in enhancing student learning outcomes.

## 5. Discussion

The general state of the Curriculum and Instruction program at Universitas Pendidikan Indonesia is satisfactory. The perceptions of professors and students on the Curriculum and Instruction process are generally positive, while several parts are notably deficient or inadequate. This can undoubtedly serve as "initial capital" for the development of an information technology-driven learning paradigm. Nonetheless, the overall motivation for student learning is minimal. Consequently, student learning results regarding knowledge are inadequate, notwithstanding the favorable marks achieved by students. The state of educational facilities and infrastructure is crucial to acknowledge. Certain educational media are still seen as insufficient, particularly regarding their quantity. This indicates a significant imbalance in the ratio of existing media to professors. Simultaneously, lecturers are required to assist all students enrolled in the education program at Universitas Pendidikan Indonesia. Students really desire that lecturers consistently employ information technology in every implementation of the Curriculum and Instruction course. Students rapidly experience boredom when instruction is conducted conventionally, which can adversely impact their learning outcomes. Information technology has significant advantages in education, such as enhancing the practicality and diversity of learning activities, fostering student engagement, creativity, and innovation, and creating a more conducive learning environment, among others. Therefore, there is no justification for lecturers to refrain from utilizing information technology in the Curriculum and Instruction process. It is along with the similar study stating that Universities must design measures to assist their pupils. Universities are encountering difficulties in administering these tests, chiefly due to the intricacy, duration, and expense involved in creating high-quality assessments. In partnership with three universities, we created three diagnostic assessments: the Social Thinking Test, the Attitudes Towards Diversity Questionnaire, and the Mathematics Test for Teaching in Primary Education (Cruz et al., 2024).

This information technology-based learning strategy is very appropriate for instructors and students in the Curriculum and Instruction course. The factors to examine are:

Generally, students have engaged with Information and Communication Technology, either via official education in schools or through non-formal educational courses. This indicates that pupils possess fundamental skills in the domain of information technology. Uttara et al (20204) stated that advocating for the inclusion of teachers in curriculum development is as crucial as enhancing their competencies to participate in curricular procedures. Redesigning standardized textbooks can mitigate curricular information overload and enhance idea clarity. Implementing an information technology-based learning approach will alleviate students' apprehension over the utilization of information technology in their education.

Secondly, based on diverse perspectives from the Curriculum and Instruction lecturer team, a learning model must be identified that is deemed appropriate for both lecturers and students, serving as a viable alternative for implementation in the Curriculum and Instruction course. This viewpoint is not exaggerated, as there has yet to be a suitable learning model for practical application by both instructors and students since the inception of the Curriculum and Instruction course. In response to these needs, it is anticipated that the information technology-based learning model may serve as an option to enhance the learning interests of students at Universitas Pendidikan Indonesia. This information technology-driven learning model can serve as a policy for the leadership of Universitas Pendidikan Indonesia to be standardized and implemented by all Curriculum and Instruction lecturers within the institution. Although students' baseline knowledge levels varied, their knowledge enhancement exhibited minimal interindividual variability. The initial knowledge level pertained to the utilization of learning chances at the commencement of the study program; nevertheless, no significant correlation was found between knowledge advancement and the augmentation of learning possibilities throughout time. Furthermore, the beginning knowledge level was forecasted

by the grade point average obtained in secondary school examinations, but not by intrinsic motivation (Weyers & Konig, 2024).

Third, the employment of information technology in this study is highly practical and adaptable for use by both lecturers and students, as all employed programs are readily accessible online. Instructors and students require merely a computing device (laptop), modem, and/or hotspot network. Students lacking a laptop may utilize a smartphone with internet connection. While Hollenstein & Brühwiler (2024) mentioned that effective teacher education is anticipated to equip future educators with pertinent professional knowledge necessary for successfully meeting the demands of their teaching practice. To enhance evidence-based teacher education, it is essential to ascertain which teacher education outcomes are indicative of high-quality instruction and student learning.

Fourth, student learning activities need not always occur on campus. Students can engage in learning activities in any location and at any time. Nonetheless, the necessity for the physical presence of lecturers and students in the classroom must persist.

## 6. Conclusion

The overall learning circumstances of the Curriculum and Instruction course are satisfactory. Nevertheless, student motivation for learning remains low, resulting in subpar academic outcomes in the Curriculum and Instruction course regarding knowledge acquisition. Information technology-based learning models are very appropriate for application in the Curriculum and Instruction course, encompassing the planning, implementation, and evaluation phases of education. Various information technology applications include software such as Google Drive, Google Presentation, blogs, 4Shared, the internet, and Google Forms. Information technology-based learning models significantly enhance student learning outcomes in the Curriculum and Instruction course. Information technology-based educational approaches markedly improve student learning outcomes in the MKDP-Curriculum and Learning course by offering interactive, tailored, and adaptable learning experiences. Methods such as Learning Management Systems (LMS), digital simulations, and multimedia content facilitate students' comprehension of intricate pedagogical concepts and curriculum design. Technology facilitates collaborative learning, prompt feedback, and access to many resources, which together enhance engagement and increase comprehension of course objectives. Information technology-driven educational methods significantly enhance student learning results in the MKDP-Curriculum and Learning.

## 7. Suggestion

The researcher advises Universitas Pendidikan Indonesia, especially to the curriculum development division, to formulate specific policies for the implementation of information technology-based learning models within the Curriculum and Instruction framework, ensuring consistent and systematic usage by all professors and students.

## 8. Limitation

Although the results are significant, the study has limitations due to the fact that it only used one instrument to gather data on testing approach, which is an objective test. There is also the issue of how the course's content and instruction are assessed in relation to the learning outcomes achieved by the students.

## Declarations

**Author Contributions.** Z.A.: Conceptualization, design, analysis, data acquisition, data analysis/interpretation, statistical analysis. B.S.: writing, editing/reviewing, supervision, admin, technical or material support. All authors have read and approved the published version of the article.

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**Ethical Approval.** All the participants in this study were notified of its intentions. Every participant has duly executed a confidentiality agreement and a data transfer form. Similarly, all data has been de-identified, ensuring the confidentiality of the participants.

**Data Availability Statement.** All data collecting and storage protocols were authorized by the Institutional Review Board as an exempt study for program enhancement. Participant identifiers were removed to ensure anonymity.

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