

**THE 2nd UPY INTERNATIONAL
CONFERENCE ON APPLIED
SCIENCE AND EDUCATION 2020**

UPY Universitas PGRI
Yogyakarta



**“ The Challenges of Science &
Technology Innovation in Society 5.0 ”**

PROGRAM BOOK

CONFERENCE DAY

November 3th – 4th, 2020

ONLINE

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Preface

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240th ECS Meeting ORLANDO, FL

Orange County Convention Center Oct 10-14, 2021



Abstract submission due: April 9

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PREFACE

Dear distinguished Authors and Guests,

The organizing committee warmly welcome you to The 2nd UPY International Conference on Applied Science and Education (UPINCASE), held on 3 – 4 November 2020 in Yogyakarta, Indonesia virtually. UPINCASE 2020 is implemented virtually, because as we all know, it is currently still in the state of the Covid-19 pandemic, so this limits our space. The topics covered in this conference include Engineering, Information Technology, Technology for Education, Applied Science, and Science Education.

On behalf of The 2nd UPINCASE 2020, we would like to thank all the authors that contributed to this conference. We would like to extend our special gratitude to the Keynote Speakers who support this conference.

- 1) Prof. Tai-Chien Kao (National Dong Hwa University, Taiwan)
Theme: Science and Technology for Future Education
- 2) Prof. Wasino (Universitas Negeri Semarang, Indonesia)
Theme: Social Transformation in Society 5.0
- 3) Dr. David Nwanna Dumbiri (University of Benin, Nigeria)
Theme: Information and Technology for Sustainable Development
- 4) Prof. Suzuki Takashi (Kobe University, Japan)
Theme: Business and Services Transformation in Society 5.0
- 5) Dr. Arman Shah bin Abdullah (Universiti Pendidikan Sultan Idris, Malaysia)
Theme: Innovation of Educational Technology
- 6) Dr. Paiman (Universitas PGRI Yogyakarta, Indonesia)
Theme: Technology Development to Increase Crop Production

The conference was held for two days and divided into two parts, Plenary Session and Parallel Session. On the first day, the keynote speaker at the Plenary Session is Prof. Kao (Taiwan), Prof. Wasino (Indonesia) and Dr. Dumbiri (Nigeria), then continued with Parallel Session. On the second day, the keynote speaker at the Plenary Session is Prof. Takashi (Japan), Dr. Arman Shah (Malaysia) and Dr. Paiman (Indonesia), then continued with Parallel Session.

The conference was held online through the Zoom Meeting, and was attended by around 250 participants on the first and second day. The technical problem at this conference was about the unequal conditions of the internet network in each participant's area, so that it was a bit of a hindrance, especially during the Parallel Session.



The number of papers presented at this conference was 172 papers, which was divided into 9 Virtual Room, in two days. After the peer review process, the submitted papers were selected on the basis of originality, significance and clarity for the purpose of the conference. We hope that the conference results constituted significant contribution to the knowledge in these up to date scientific field.

We will be committed ourselves to make this conference more and more professional with fully and enjoyable academic research and discussion platform for authors and attendees. Sincerely as always, we look forward to your attention and support to the next UPINCASE.

With our warmest regards,
Marti Widya Sari

Conference Chair
5 November 2020
Universitas PGRI Yogyakarta, Indonesia

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Peer review declaration

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Peer review declaration

All papers published in this volume of *Journal of Physics: Conference Series* have been peer reviewed through processes administered by the Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

- **Type of peer review: Single-blind**

single-blind peer review that reveals the author's name to the reviewer, but hides the reviewer's name from the author.

Peer Review Process (Fig. 1)

The article submission system is carried out through an international conference web, namely on the <http://upincase.upy.ac.id>. Articles submitted must follow the format (template) provided. Article submission terms are as follows.

- Articles submitted must be free from plagiarism elements.
- The submitted article is a work that has never been published in other media.
- Articles submitted are following the specified scope of the conference.

The editor carries out this selection process by paying attention to the scientific field's suitability between the article and the editor. Each article is selected by experts in their fields, according to their respective scientific fields, the articles that pass are excellent and quality articles. Articles that are declared to have passed according to predetermined criteria are then distributed to reviewers for input and improvement. Reviewer conducts a review process on submitted articles according to their field of expertise. Reviewers only provide suggestions and input to the editor on whether the article is worthy of publication or not.

The review process is carried out using a single-blind review process system. A review process is carried out where the author does not know who the reviewer has reviewed the article. Meanwhile, the reviewer knows the name and affiliation of the author

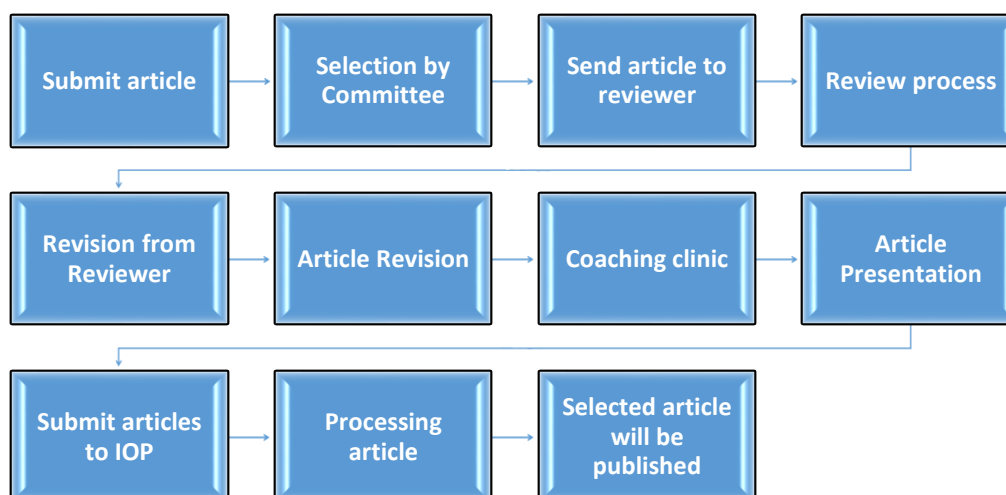


Fig. 1. Article Submission and Review Process

After the review process is carried out and the article has received suggestions and input, the author must improve according to the suggestions and input. If it has been corrected, the author sends back the article to the editorial team for other presentations at the conference. The committee provides particular times for the coaching clinic to improve articles. Furthermore, the articles will be sent to the publisher to be published in an International Conference Proceedings (IOP).

- **Conference submission management system:**
Online via conference website <http://upincase.upy.ac.id>
- **Number of submissions received: 250**
- **Number of submissions sent for review: 240**
- **Number of submissions accepted: 172**
- **Acceptance Rate (Number of Submissions Accepted / Number of Submissions Received X 100): 68%**
- **Average number of reviews per paper: 3**
- **Total number of reviewers involved: 30**
- **Any additional info on review process:**
- **Contact person for queries (please include: name, affiliation, institutional email address)**

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ROOM 8**Moderator: Juang Kurniawan, M.Pd**

No	Time (WIB)	Paper ID	Author(s)	Paper Title
1	13.15 – 13.30	088	Fitri Susilowati, Suryanto	Forecasting LQ45 Shares Using ARIMA Method aim the COVID-19 Pandemic in Indonesia
2	13.30 – 13.45	038	Zidni Husnia Fachrunnisa, Baniady Gennody Pronosokodewo	Optimization Of The Bersih Indah Muja Muju Waste Bank Management System
3	13.45 – 14.00	128	Avif Septiana, Mohammad Kanzunnudin, Murtono	Illustrated folklore books as a simple technology to foster a culture of literacy
4	14.00 – 14.15	045	Muhammad Badri	Adoption of innovations online tutoring apps on high school students
5	14.15 – 14.30	022	Theofilus Bayu Dwinugroho, Yaning Tri Hapsari, Kurniawanti	Greenhouse Automation: Automated Watering System for Plants in Greenhouses using Programmable Logic Control (PLC)
6	14.30 – 14.45	111	Dinar Ayu Mirunggan Sari, Murtono, Irfai Fathurohman	The Usage Of Sunda Manda Media Based On Visualization Auditory Kinesthetic To Improve Motoric Skills
7	14.45 – 15.00	057	N Setiani, B R Aditya, I Wijayanto, A Wijaya	A Study On Awareness Of Bibliographic Management Software For The Academic Writing Activity In Higher Education
8	15.00 – 15.15	091	Rosalia Indriyati Saptatiningsih, Setia Wardani, Marti Widya Sari	Applying information and communication technology on learning model innovation of character education
9	15.15 – 15.30	018	H Wiranota, T T Wijaya	The International Students' Perception Towards Online Learning Using The Tencent Meeting During Covid-19 Outbreak
10	15.30 – 16.00	168	Laeli Nur Hasanah, Rosmauli Jerimia Fitriania	Effect of Frying on The Nutritional Composition of Catfish Nuggets (<i>Clarias gariepinus</i>) Substituted by Modified Cassava Flour (Mocaf)



THE 2nd UPY INTERNATIONAL CONFERENCE ON APPLIED SCIENCE AND EDUCATION 2020
" The Challenges of Science & Technology Innovation in Society 5.0 "

CERTIFICATE

No: 226/LPPM-UPY/XI/2020

Awarded

Muhammad Badri

As Presenter with the paper entitled

Adoption of innovations online tutoring apps on high school students

Held at Universitas PGRI Yogyakarta (Yogyakarta, Indonesia), 3 - 4 November 2020.

Yogyakarta, 4 November 2020

Rector UPY

A blue ink signature of Dr. Ir. Paiman, M.P., written in a cursive style.

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Adoption of innovations online tutoring apps on high school students

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Abstract. This study aimed to discover the adoption of innovations online tutoring apps on high school students. This study used the diffusion theory of innovation with an innovation-decision process model approach with indicators of knowledge, persuasion, decision, implementation, and confirmation. The research was conducted in Pekanbaru City, Riau Province, Indonesia. Data collection used a survey method on 120 respondents from state and private senior high school students representing public schools, vocational schools, and religious schools. This study found that most of the respondents were users of online tutoring apps (71%). The decision of adoption has gone through the stages of knowledge, persuasion, decision, implementation, till confirmation, with a moderate to high score average. The score of using online tutoring apps to support learning activities and support achievement was relatively high. At the confirmation stage, the score of the desire to continue adopting the online tutoring apps was high (71%), it indicated that most of them will continue to adopt online tutoring apps. These findings illustrated that high school students are adopters of online tutoring apps innovation. As a post-millennial generation, they are an important generation for realizing Society 5.0 in Indonesia.

Keywords: Adoption of Innovation, Online Tutoring Apps, High School Students

1. Introduction

Society 5.0 changes the relationship between human and technology, from technology as a tool into technology as the power to create a super-smart society. Society 5.0 combines cyberspace and physical space to balance economic progress in solving social problems [1]. Society 5.0 is a new human-centered vision of society [2] it is aimed at the welfare of society [3]. The education system should be directed towards Society 5.0 in both research and teaching [4]. The use of the Internet of Things (IoT), big data, and artificial intelligence (AI) in education is needed to realize Society 5.0 [5].

One of the digital-based educational technology implementations is the online tutoring apps. Changing the demographic of student, larger classes, and the growth of part-time studies, it leads to many developers of tutoring alter to online media for teaching and learning [6]. Online learning is expected to be one of the important tools to improve access to education [7]. If it is designed properly, an online learning system can be used to determine the needs of students, adjust the appropriate material, and achieve the desired learning outcomes [8]. Effective online tutorials are influenced by tutor learning strategies and the rationality of using the internet [9].

Interest in online tutoring apps is also relatively growing in Indonesia. One of the digital education startups recorded a 10-fold increase in users in the 2016 to 2018 period, with an accumulation of users reaching 13 million people [10]. However, the data is general and it does not represent users in a certain



city. Seeing the limited data of online tutoring apps users, the research on the use of online tutoring apps is interesting, especially among high school students.

Previous research on digital technology-based education in Indonesia found that high school students often access the internet to collect alternative learning sources besides teacher teaching [11]. Senior high school students understand how to access data from the internet and understand that the internet can be used as a learning resource [12]. The presence of digital learning media apps has received a positive response from high school students and it has functioned effectively as a source of independent learning [13]. The virtual class can also be used for practical lessons [14].

Online tutoring through computer-mediated communication (CMC) is very efficient for learning activities. Successful online tutoring requires well-designed resources to support learning activities [15]. The use of online tutoring apps is influenced by human, technology, usability, and ergonomics aspects. Students like apps that provide easy, fun, and interesting learning, with content that is not only text but also videos and animation [16]. Factors that affect the effectiveness of online tutoring cover the tutor's ability to operate technology, find out useful information, create teaching materials with technology, and the willingness and ability of tutors to use different learning strategies [17].

The main determinant of the success of online tutoring technology is the user [18], the role of tutors, and online tutoring scaffolding [19]. The online learning model utilizes smartphones and it has great potential to be developed [20]. At the student level, the outcome of online learning is better to occur when students log in frequently and stay logged in longer [21]. To find out the online tutoring ecosystem, it is necessary to conduct research with an innovation diffusion approach, to see the process of spreading innovation to the community [22]. The diffusion of innovation is generally referred to the spread of technology in a social context [23]. The innovation diffusion theory is widely used to identify information technology adoption [24]. The theory of innovation diffusion is commonly used to examine the innovation of communication, the process of innovation-decision, and the impact of innovation. This study aimed to discover the adoption of innovations online tutoring apps on high school students through the analysis of the process of innovation decisions.

This study used an innovation-decision process model [22] with indicators of the stages of the process of innovation-decision including (1) knowledge, (2) persuasion, (3) decisions, (4) implementation, and (5) confirmation. The stage of knowledge describes how the individual learns about innovation and its uses. The persuasion stage describes the assessment of innovation. The decision stage illustrates how the individual makes the choice to accept or reject the innovation. The implementation stage reveals the use of innovation by those who accept the innovation. Finally, the confirmation stage explains whether the individual who has adopted will continue the innovation or not, and vice versa for those who refuse.

2. Method

The research was conducted in Pekanbaru City, Riau Province, Indonesia. The data collection obtained through a survey method toward 120 respondents from state and private senior high school students representing public schools, religious schools, and vocational schools. The research questionnaire used a Likert scale to measure respondents' attitudes or opinions on the innovation-decision process of online tutoring apps with indicators: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. The respondent's answer score was then calculated using the Weight Means Score (WMS) formula with the following indicators: 1% to 20% (very low), 21% to 40% (low), 41% to 60% (moderate), 61% to 80 % (high), and 81% to 100% (very high).

3. Result

The respondents of this study were state senior high school students (66.7%) and private senior high school students (33.3%). They represented the public schools (33.3%), vocational schools (33.3%), and religious schools (33.3%). The gender of respondents consisted of male (42.5%) and female (57.5%) from class 11 (51%) and class 12 (49%). Respondents' achievement in school consisted of rank 1 to 5 (18.3%), rank 6 to 10 (28.3%), and rank 10 and above (53.3%). Next, the findings of the stages of the innovation-decision process are presented.

3.1. Knowledge

The knowledge stage is the initial stage of the innovation-decision process, namely when someone gets information or knowledge about the innovation and its attributes [22]. At this stage, the individual begins to know information about the innovation, its benefits, and assesses its need for innovation.

Table 1. Indicators of online tutoring apps knowledge

No	Indicators	Score (%)
1	The activeness of using a smartphone	90
2	The Ability to buy internet packages	75
3	Knowledge of online tutoring apps	79
4	Knowledge of the benefits of online tutoring apps	78
5	Assessment of the need for online tutoring apps	70
	Average score	78.4

This study finds out that the average score for the knowledge indicator is high (78.4%). The highest score is the level of smartphone use by respondents, namely very active (90%), it indicates that the basic platform for innovation installation is already available. The lowest score is the level of need for online tutoring apps (70%).

3.2. Persuasion

Persuasion is the formation of attitudes and changes in individuals. At this stage, the individual is actively seeking information about the innovation, the individual decides based on the individual considers credible, and the individual decides how the person will interpret the information has received. In addition, persuasion is influenced by the attributes of innovation, namely relative advantage, compatibility, complexity, trialability, and observability [22].

Table 2. Indicators for online tutoring apps persuasion

No	Indicators	Score (%)
1	Perception on the advantages of online tutoring apps	62
2	The need for online tutoring apps	72
3	Easy level to installed	80
4	Easy level to learn	71
5	Easy level to use	75
6	The support of parents for using online tutoring apps	74
7	The support of teacher to use the online tutoring apps	74
8	Persuasion by advertisement	68
	Average score	72

This study discovers that the average score of knowledge indicator is high (72%). The highest score is the respondent's perception toward the ease of the apps which is installed (80%). The lowest score is the perception of the advantages of online tutoring apps compared to conventional tutoring (62%). In communication indicators, the support of parents and teachers is higher than persuasion from advertisements in mass media and social media.

3.3. Decision

At the decision stage, the individual chooses to adopt or reject the innovation. At the decision stage, individuals take the concept of innovation and consider the advantages or disadvantages of using innovation. One way of dealing with the inherent uncertainty about the consequences of innovation is to attempt partially new ideas. Testing is an important part of the decision to adopt. Methods for facilitating the trial of innovation, for example, free samples [22].

Table 3. Indicators of decision to adopt an online tutoring apps

No	Indicators	Score (%)
1	The experience of trying online tutoring apps	66
2	The level of liking for online tutoring apps	67
	Average score	66.5

This study reveals that a high level of respondents' trial of online tutoring apps innovation (66%). The level of preference of respondents to online tutoring apps is also relatively high (67%). After going through the trials, the individual then decides to accept or reject the innovation.

3.4. Implementation

The implementation occurs when an individual uses innovation. Implementation usually follows the decision-making stage directly [22]. This research found 71% of respondents adopted the online tutoring apps and 29% did not adopt it. The level of individual adopter innovativeness can be divided based on the time period they adopted to see if they were early adopters (>1 year), early majority (6 to 12 months), late majority (<6 months), or laggards (did not adopt). In this study, innovators were not included, because the diffusion of online tutoring apps was mass and open, thus, it was difficult to determine innovators.

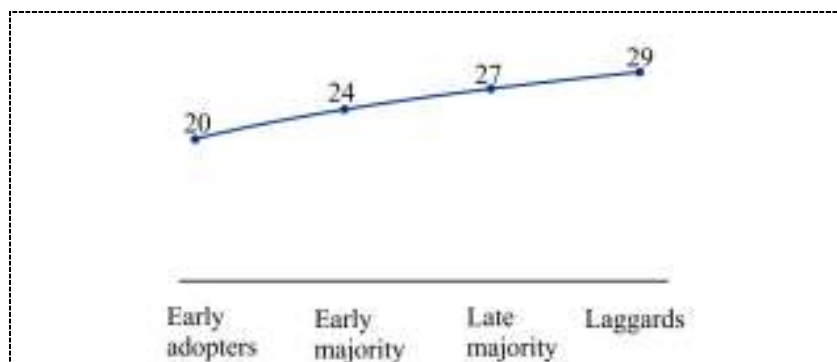


Figure 1. The level of respondents' innovativeness

Figure 1 indicates that a graph of individual innovativeness shows the fewest early adopters with the direction of the graph that shows a greater value towards Laggards or not adopting. Although most of them have adopted it, the average implementation score is moderate (59%), it implies that they do not always open the apps every day. The use of these apps to support learning activities and support achievement is the same as a relatively high score (Table 4).

Table 4. Indicators of online tutoring apps implementation

No	Indicators	Score (%)
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1	Access the online tutoring apps everyday	51
2	Use to support learning activities	63
3	Use to increase achievement	63
	Average score	59

3.5. Confirmation

The empirical evidence from several researchers points out that the decision to adopt or reject an innovation is not the final stage of the process of innovation decision. However, there is a confirmation stage, in which the individuals seek reinforcement of the innovation decisions that they have made, and it can change decisions if the innovation is in contrast [22].

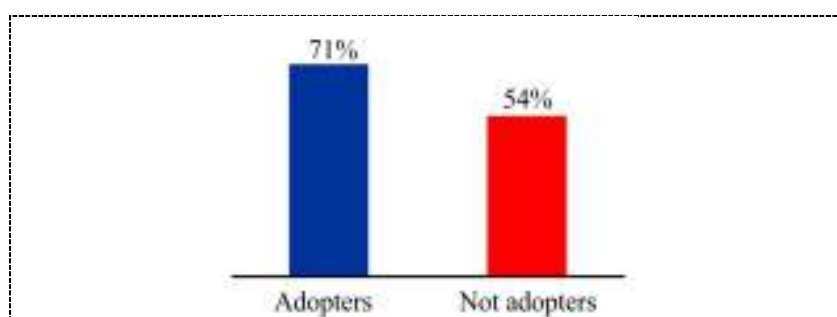


Figure 2. The comparison of confirmation of adopter and not adopter of online tutoring apps

This study points out that a high level of confirmation of respondents who have used the online tutoring apps is (71%), it signifies that most of the respondents will continue to adopt the online tutoring apps. The level of confirmation of respondents who have not adopted is moderate (54%), it indicates that some of them will become slow adopters.

4. Discussion

The findings of this study signifies that high school students are potential adopters of online tutoring apps. It is due to computer technology and the internet continues to influence people's lives, especially teenagers [25]. The large potential for the adoption of this online tutoring apps is due to respondents are very active smartphone users (90%). A number of studies have also revealed that teenagers spend a lot of time on smartphones [26][27]. The positive impact of using the internet is explained by several previous studies, it points out that high school students often access the internet [11], use it for learning [12] so that it is relatively effective for independent learning [13].

High school students use the online tutoring apps to support learning activities and improve achievement. The high score of motives for increasing achievement signifies that the tutoring apps can cover the lack of knowledge in learning activities at school. Other research has also found the use of ICT can improve academic achievement [28]. Moreover, if the learning system is based on multimedia, it is more effective than conventional one [29]. This strengthening of ICT and IoT is a realization of the era model of education in Society 5.0 [5]. Thus, in the era of Society 5.0, schools have the task of adjusting their education programs for digital natives in preparation for the future job market [4].

5. Conclusion

The adoption of online tutoring apps innovations in high school students was relatively high. The adoption decision had been through the stages of the innovation-decision process starting from knowledge, persuasion, decision, implementation, and confirmation, with a moderate to high score

average. The motive for using the online tutoring apps was to support learning activities and to support achievement with a high preference for using the apps, with the support from parents and teachers as well. These findings indicated that the online tutoring apps innovation was accepted by a group of high school students. The acceptance of apps-based education is a significant asset to realize Society 5.0 as the vision of a new society, namely a super-smart society.

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