

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

**“Revitalization of Technical and Vocational Education to Face
Industrial Revolution 4.0”**

Surabaya, 11-14 July 2018

Speakers:

Prof. Dr. Muhadjir Effendy, MAP.
Minister of Education and Culture, Republic of Indonesia

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*Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to
Indonesia, ASEAN and Timor-Leste (German)*

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Prof. Dr. Muchlas Samani, M.Pd.
Rector of Universitas Negeri Surabaya period 2010-2014 (Indonesia)



Faculty of Engineering
Universitas Negeri Surabaya
2018

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

“Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0”

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PREFACE

All praises be to Allah SWT, so that the 2018 International Conference of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** could be held in Surabaya during 11-14 July 2018. APTEKINDO International Conference is conducted biennially in which this year host is Faculty of Engineering, State University of Surabaya. There were sixteen colleges attending this year Conference, most of which were former Institutes of Teacher's Education (LPTK).

This year theme is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*" aimed to respond to the development and acceleration of the industrial revolution 4.0 that has become the most discussed issues in many countries. Industrial revolution connects machines with internet systems. In regard to facing such phenomena, Indonesian government through the Ministry of Industry has launched "Making Indonesia 4.0", of which the program focuses on industries that are driving the development of the industrial revolution 4.0 such as food and beverages, electronics, automotive, textiles and chemicals. To achieve better results of the program actualization, vocational education helps to prepare compatible and competitive workers for the areas of the aforementioned industries. Henceforth, numbers of Conferences, conventions, and meetings among Indonesian practitioners in FPTK / FT-JPTK need to be held to initiate ideas in strengthening the role of LPTK within industrial revolution 4.0 era.

The Conference's proceedings contain 121 research papers and ideas that are relevant to the following nine sub-themes: *Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competencies Certification.*

Finally, all the committees send their gratitude to the participating speakers and all parties who support the run of the Conference. They also apologize for any inconvenience and wish a better undertaking event next year.

WELCOMING SPEECH RECTOR UNESA

Conference and Convention

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (Aptekindo) 2018

Rich Palace Hotel Surabaya, 11-14 Juli 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

Respectable Head of Universities, members of APTEKINDO

Distinguished Keynote speakers

Honorable authors, and fellow participants of APTEKINDO Conference and Convention 2018

Alhamdulillah, first of all, let us express our gratitude to Allah SWT because of his grace and blessings, we are able to attend this international Conference and convention of the Indonesia Association of Technology and Vocational Education or ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** held in Surabaya, 11-14 July 2018.

This international and national Conference is conducted biennially as a routine agenda held by Association of Technology and Vocational Education or *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia* (APTEKINDO), which consists of 16 different universities throughout Indonesia. We would like to thank for the opportunity given to Universitas Negeri Surabaya for hosting this year event.

In the raise of industrial revolution, Conferences, gatherings, and sharing of knowledge play an important meaning in supporting the acceleration of innovative science and technology. Therefore, this Conference's theme is ***"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"***. This is an interesting and challenging topic not only for academic researchers but also for stakeholders and industry owners.

Ladies and gentlemen,

Since 2011, the industrial sector has been integrated with the online system known as industrial revolution 4.0. The first industrial revolution was marked by the use of steam engines to replace human and animal power. The second stage of the revolution was marked by the utilization of electrical power and the concept of mass production. Furthermore, the application of automation technology brought the industrial revolution to its third stage. Tremendous revolution happened when information and communication technology was introduced and fully utilized in industrial area, of which the condition brought the world in the fourth stage of the industrial revolution. The utilization of this technology changed not only the production process, but also across the industrial chains that result in a new digital-based business model which can achieve higher efficiency and better quality in industrial products. The consequences of this revolution are the increase of production efficiency as well as changes in the employment prerequisite. There is an increasing demand for new manpower, whilst the machines are replacing the role of workers. This condition leads to the importance of a new and more advanced method of preparing human resources that are ready to compete in the industrial revolution.

Ladies and gentlemen, in regard to prepare Indonesian human resource in facing the era of media convergence, there are at least two aspects that need our attention, namely the quality of human resources in accordance with the requirement of the digital-based industry and the equal distribution of qualified human resources especially in suburban and urban areas. Both aspects could be meant as a challenge and an opportunity for the higher education especially technology and vocational education to innovate and harmonize curriculum that connects with the industry. Thus, this Conference becomes a perfect momentum for technology and vocational education to join and strengthen steps in preparing graduates that are ready to compete in the industrial revolution 4.0. Therefore, by starting with **“Bismillahirrahmanirrahim” The Conference and Convention of Association of Technology and Vocational Education or APTEKINDO 2018, is officially started**”

Ladies and gentlemen, we would like to thank the keynote speakers who are willing to attend and share knowledge in today’s Conference:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, ***Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.***
3. Prof. Dr. Wenny Rahayu, *La Trobe University Victoria (Australia)*
4. Prof. Dr. Muchlas Samani, M.Pd., *Rector Universitas Negeri Surabaya (2010-2014).*

We also would like to thank the authors and all participants of the convention who have participated and contributed to sharing the knowledge and ideas. Hopefully, what we share and get here today can give benefits and contribute to improve a competitive atmosphere in Indonesia, Aamiin YRA.

Surabaya, July 2018
Universitas Negeri Surabaya
Rektor,

Prof. Dr. Warsono, M.S.

WELCOME SPEECH BY THE DEAN OF FACULTY OF ENGINEERING
at the International Conference and National Convention of
Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018
Rich Palace Hotel, 12 July 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya
Respectable the Head of Universities as the members of APTEKINDO
Distinguished Keynote Speakers
Honorable authors and Participants

Alhamdulillahirobbil alamiin. Thanks God. First of all, let us express our gratitude to Allah SWT because of his grace and blessings we are able to attend the 9th International Conference and convention of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** and the 19th workshop of the Technology and Vocational Education for FPTK/FT/FTK-JPTK in Indonesia. It is an honor for us, the Faculty of Engineering, Universitas Negeri Surabaya, to host this year Conference and convention.

On behalf of *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*, we would like to welcome keynote speakers, authors, delegates and participants from technology and vocational education to the city of heroes, Surabaya.

Today, we meet in Surabaya to attend a biennial agenda named APTEKINDO International Conference and Convention and National Workshop of the FPTK/FT/FTK-JPTK. Following the mandate from the 2016 APTEKINDO Convention in Medan, this year's Conference is held in Surabaya hosted by the Faculty of Engineering, Universitas Negeri Surabaya.

Ladies and Gentlemen, the theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". The theme is chosen due to the fact that we have to quickly respond and act accordingly to the effects of the industrial revolution on vocational education. Well-programmed and structured efforts should be undertaken to ensure if technology and vocational education can produce globally competitive graduates especially for industrial revolution era.

Numbers of important topics for technology and vocational education are discussed in this Conference. The topics include Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competence Certification.

Today's Conference has several outcomes. The accepted articles will be submitted for proceeding publication indexed by Atlantic Press. Meanwhile, the rejected articles by Atlantic Press will be published in the International Proceedings with International Standard Book Number (ISBN). Moreover, the articles written in Bahasa Indonesia will be published in the National Proceedings with ISBN.

Ladies and Gentleman, this meeting must be meaningful as a venue to communicate among researchers, academics, and members of FPTK / FT / FTK-JPTK from different universities as well as from related industries. By this regular Conference and convention, we can make a strong communication network and create innovative breakthrough and substantial blueprint of different aspects such as institutional quality, field study, and curriculum. We hope that this forum plays an important role in developing technology and vocational education to face the industrial revolution 4.0.

Finally, we would like to thank the organizing committee led by Mr.Tri Wrahatnolo, M.Pd., M.T., who gave an extraordinary support. Moreover, we would like to express our appreciation and gratitude to the members of steering committee from various regions in Indonesia, delegates, SC and OC members, sponsors, as well as personal or institutional support that make this event well-organized. I apologize if there are shortcomings from my part.

Good luck with the Conference of Indonesian Association of Technology and Vocational Education, APTEKINDO 2018, and wish the best improvement for technology and vocational education in Indonesia. Thank you.

Wassalammu'alaikum Warahmatullahi Wabarakatuh

CHAIRMAN'S SPEECH

**at the International Conference and National Convention of
*Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018***

Rich Palace Hotel, 11-14 July 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya,
Respectable the Head of Universities, members of Aptekindo, Keynote speakers, Authors, and fellow participants of Aptekindo Conference and convention 2018.

Alhamdulillah, no words could represent the feelings but the gratitude of the presence of Allah SWT, for His blessings, so that we can attend APTEKINDO Conference with the theme "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*".

In this pleased occasion, we would like to welcome all keynote speakers, authors, and participants of the Conference to this city of heroes, the city of heroic histories, Surabaya. We would like also to welcome to APTEKINDO 2018 Conference and convention held at the Rich Palace Hotel Surabaya, 11-14 July 2018.

The theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". This theme is chosen to respond to the development and acceleration of industrial revolution 4.0 that has been impactful in various countries. This industrial revolution has connected the utilization of machines to an internet system. To face such phenomena, Indonesian government through the Ministry of Industry has launched a program called "Making Indonesia 4.0". Currently, the government is focusing on industries that support the development of the industrial revolution such as food and beverage, electronics industry, automotive, textile and clothing, and chemical industries.

In addition, vocational education plays an important role in preparing competent and competitive human resources. That is, Faculty of Technical and Vocational Education or *Fakultas Pendidikan Teknik dan Kejuruan (FPTK)* in Indonesia aims to compile excellent ideas and vision, which later could be shared through Conferences, conventions or meetings, and also be useful to encounter industrial revolution 4.0.

Today's Conference will present competent keynote speakers in the field of technology and vocational education, who are:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern-Sternberg, Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.
2. Prof. Dr. Wenny Rahayu, La Trobe University Victoria (Australia)
3. Prof. Dr. Muchlas Samani, M.Pd., Rector of Universitas Negeri Surabaya (2010-2014).

In addition, I would like to point out that there are 602 participants from 17 different universities participating in today's Conference involving:

1. Universitas Palangka Raya
2. Universitas Gorontalo
3. Universitas Islam Negeri Ar Raniry Aceh
4. Universitas Negeri Solo
5. Universitas Negeri Manado
6. Universitas Pendidikan Ganesha
7. Universitas Nusa Cendana
8. Universitas Malang
9. Universitas Negeri Jakarta
10. Universitas Negeri Padang
11. Universitas Negeri Yogyakarta
12. Universitas Pendidikan Indonesia
13. Universitas Negeri Makassar
14. Universitas Negeri Semarang
15. Universitas Negeri Medan
16. Universitas Negeri Surabaya
17. Universitas PGRI Adi Buana Surabaya

There are 491 articles submitted to this Conferences covering papers and posters. 76 articles were accepted to Atlantic Press, 156 articles published in international proceedings with ISBN, dan 129 articles published in the national proceedings with ISBN. All articles will be available for an online access through the Atlantis Press official website and through APTEKINDO 2018 website.

Today's Conference is actually held with the helps and good cooperation of various parties. Therefore, we would like to express our gratitude to the Minister of Research, Technology and Higher Education, Rector of Universitas Negeri Surabaya, keynote speakers, participants, sponsors, and other stakeholders for the supports. We also send our highest appreciation to the committees who have worked hard to succeed this Conference.

At last, we hope that all participants get benefits and knowledge that can contribute to reinforce vocational education and technology in facing the industrial revolution 4.0. WELCOME TO APTEKINDO CONFERENCE AND CONVENTION 2018, Thank you.

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Application of Cooperative Learning Models of Type Jigsaw to Improve Student Learning Result in Smk

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Abstract— This study is a classroom action research which aim to know the improvement of learning outcomes on the subject of agribusiness of vegetable crops using a jigsaw type cooperative learning model students class XI agribusiness food crops and horticulture SMK State 4 Gowa. The subjects of this study were students of class XI ATPH 3 SMK State 4 Gowa lesson year 2017/2018 with a total of 21 students which is implemented in two cycles and each cycle is held in 4 meetings. Data collection techniques used is through the initial test and the test at the end of the cycle. The results of this study indicate that the application of jigsaw type cooperative learning model can improve the learning outcomes agribusiness vegetables. Plearners in the first cycle with the average value that is 69,85%, whereas for classical completeness reach 42,85% and on the implementation of cycle II increases with the average value 81,90%, whereas for classical completeness reach 95,23% or 20 students from 21 students who are in the category of completion.

Keywords—*cModel, Cooperative Learning, Jigsaw, Student*

I. INTRODUCTION

Education is a very important human need because education has the task to prepare human resources for nation and state development. Advancement of science and technology resulting in changes and growth towards a more complex. This raises social problems and new demands that can not be foreseen before, so that education is always facing the problem because of the gap between expected with achievable results of the educational process (Adi, 2012).

In this case, the role of teachers is very important in order to achieve the educational outcome. Guru is one of the human element in the educational process. In the process of education in school, teachers hold the dual task of being teachers and educators. As a teacher of teachers in charge of pouring a number of lessons into the brains of students, while as educators, teacher in charge of guiding and fostering students to become a capable, active, creative, and independent human being.

Djamarah (2005) argue that both teaching and educating is the duty and responsibility of teachers as professionals

become human decency capable, active, creative, and independent. Therefore, heavy duty of a teacher basically it can only be implemented by teachers who have professional competence which is high. Included in it for the role of teachers in vocational education.

Efforts of teachers in teaching and learning process also affects the learning outcomes. Teacher's high passion to teach, making learners more passionate about learning. Teaching and learning activities should be able to foster motivation to learn so that the effect on the learning outcomes of learners. Motivation learning plays a very important role in spirit, pleasure in learning, so as to have high motivation. Motivation is an impulse within a person to try to control good behavior change in fulfilling the needs. Can not be denied again in every process there are many barriers to learning especially on subjects of agribusiness of vegetable crops. The results of preliminary observations have been made in April 2017 in state SMK 4 Gowa shows that there are still teachers who only use media boards, books and dictate or lecture as a learning method for easier reasons, practical and simple. There is the assumption of a learner and teacher that subjects of agribusiness of vegetable crops tend to be boring because they use media and methods that are less varied (monotonous) so that learners are less interested, learners become drowsy, lazy on the subject. Pursuant to that matter, hence in this research applied jigsaw cooperative learning model. Through this learning model it is expected that the cooperation between students in the group

to achieve the learning objectives. This is in line with opinion Sholiha (2016) which states the method of learning can foster interaction among learners so that learners become more motivated and more active in the learning process.

PURPOSES

This research aims to determine improvement of learning outcomes of students on the subject of agribusiness of vegetable crops through jigsaw type cooperative learning model in SMK state 4 Gowa.

II. METHOD

This research is the Classroom Action Research with the implementation stages include: planning, execution, observation, and reflection.

This research was conducted at SMK state 4 Gowa, Gowa Regency. The research time is held in odd semester of academic year 2017/2018.

Research subject is the eleventh grade learners of Agribusiness of Food Crops and Horticulture odd semester SMK state 4 Gowa as many as 21 students. This classroom action research implemented in two cycles ie cycle I implemented in 4 meetings, as well, with cycle II which was held for 4 meetings.

The procedure used in this research including action plans, observations, and reflections. Operational research steps include action planning, action, observation stage, and reflecting (Figure 1).

At the planning stage that needs to be prepared ie: (1) request permission to the school and subject teachers agribusiness of vegetable crops of class XI ATPH SMK state 4 Gowa; (2) Preview observation to get an initial picture of the teaching and learning activities especially subjects of agribusiness of vegetable crops class XI ATPH (3) identify problems in the implementation of learning that has been done. After that, held identification of problems in class, then carried out the implementation of the research cycle

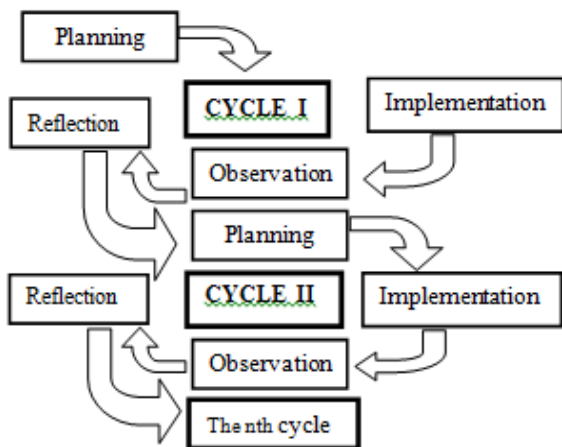


Fig. 1. Class Action Research Flow Diagram (Arikunto 2010)

III. RESULTS AND DISCUSSION

Before the researchers apply the planned action, first the researchers held pre test it is intended to know whether any of the learners who already know about the agribusiness material of vegetable crops to be taught and to determine the initial ability of learners, of results pre test then compared with the results post test (tests on each cycle) with the application of the Jigsaw Cooperative Model of learning. The data of the test results can be seen in the table below.

TABLE I. FREQUENCY DISTRIBUTION OF STUDENT LEARNING COMPLETE LEARNING AT THE EARLY TEST

Score	Frequency	Percentage (%)	Category
0-74	20	95,23	Not complete
75-100	1	4,77	Completed
Total	21	100	

^a. Source: Primary Data After Processing, 2017

Table 1 shows that on the initial test the percentage of learning mastery learners 4,77% ie 1 of 21 learners included in the category of complete, whereas 95,23 or 20 of 21 learners are included in the category of complete, whereas 95,23 or 20 from 21 students there are still 20 students who have not completed the learning outcomes and require repair in the first cycle of learning.

Results of the Cycle I Test

In the first cycle tests carried out the study of students after the presentation of three meetings. The data of the test results can be seen in the table below:

TABLE II. DISTRIBUTION OF FREQUENCY OF LEARNING COMPLETED LEARNERS IN CYCLE I

Score	Frequency	Percentage (%)	Category
0-74	20	57,14	Not complete
75-100	9	42,86	Completed
Total	21	100	

^b. Source: Primary Data After Processing, 2017

Based on Table 2 it appears that the results of learning mastery in cycle I of 42,86% or 9 students from 21 students are in the category of complete and 57,14% or 12 students from 21 students 12 students from 21 students. This means that there are 12 students who need improvement because they have not reached the learning completeness criteria.

Based on the criteria in the classical mastery learning ie 85% of the complete number of learners. Data of research result from cycle I considered incomplete because that is complete only 42,86%. This research needs to be continued in the next cycle because based on the goal to be achieved, increased learning outcomes have not been achieved.

Results of the Cycle II Test

In cycle II conducted test results learners learn after the presentation of three meetings. The test results data can be seen in the table below:

TABLE III. DISTRIBUTION OF FREQUENCY OF LEARNING COMPLETED LEARNERS IN CYCLE II

Score	Frequency	Percentage (%)	Category
0-74	1	4,77	Not complete
75-100	20	95,23	Completed
Jumlah	21	100	

^c Source: Primary Data After Processing, 2017

Based on Table 3, shows that on the second cycle test, percentage mastery learners learn as big 95,23% ie 20 students from 21 learners included in the category of completion, while 4.77% ie 1 learner categorized not complete.

This means that this research does not need to continue in the next cycle because based on the goal to be achieved, ie an increase learning outcomes expressed based on the criteria of learning outcomes on class mastery of classical mastery, namely 85% of the complete number of learners, the data of research results in cycle II in this is considered due diligence learners who have completed have reached 95,23%.

Based on the results of research that has been done. Based on the results of research that has been done on the subject of agribusiness of vegetable crops obtained an increase in learning outcomes in class XI students ATPH 3 SMK State Gowa. Implementation of Jigsaw Cooperative Learning Model applied by a teacher is one of the factors that determine ketercapain learners learn outcomes, because the use of teaching strategies that match the material presented will affect the interests and activities of learners in following the lesson which will ultimately affect the learning outcomes. Jigsaw Type Cooperative learning model strongly supports the results of research that has been obtained.

Improved learning outcomes of learners have reached KKM standards for the subjects of agribusiness vegetable crops namely 75,00 and achieve the classical thoroughness

that is 85% of the number of existing learners. This can be seen from the learning result of class XI students ATPH 3 which shows the value of completeness obtained from the initial test results ie the number of students who are not complete 20 student or 95,23% and a complete number of 1 learner or 4,77%, then on the learning outcome of cycle I with an unfinished number of learner as many as 12 students or 57,14% and complete number of learners as many as 9 students or 42,86%. Furthermore, on result of learning cycle II with the number of learners which is not complete as much as 1 learner or 4,77% and the number of learners who complete as much 20 learners or 95,23%.

Improved learning outcomes of learners supported also by the increasing activity of learners. Basically, at the beginning of the meeting experienced obstacles in the learning process. Learners are more likely to be passive or do not have the courage to express opinions or asked. This is caused by the learner who still shyly argue in front of other learners. Learners are also more active in playing than pay attention to teacher explanations.

Improved learning outcomes of learners using the Jigsaw Type Cooperative learning model on the subject agribusiness of vegetable crops class XI Agribusiness of Food Crops and Horticulture SMK State 4 Gowa in cycle I to cycle II supported by increased learning activities of learners after going through the learning experience within a certain time which is measured using the tests given by the teacher.

IV. CONCLUSION

Based on the results of the research can be concluded that after applying the jigsaw learning model which is done as much as two cycles which is done as much as two cycles SMK State 4 Gowa on the subject of agribusiness of vegetable crops, this can be seen from the increase in the average value obtained by learners during the research.

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