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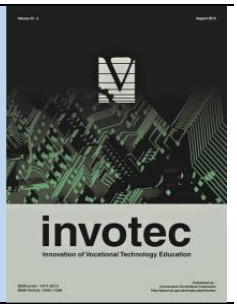

ADAPTATION OF GEOMATICS ENGINEERING TEACHER OF DUAL EXPERTISE PROGRAM TO NEW SKILL COMPETENCIES

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ABSTRACT

Research on eleven participants who work as teachers of the Geomatics Engineering Dual Expertise Program spread across various provinces throughout Indonesia has provided an in-depth desciption of the adaptation process they experienced to their new competency skills. The author conducts interviews with *video calls* through applications on sosial media by giving several questions to participants and also asking participants to tell about the adaptation process they have experienced so that the results obtained from this interview are more in-depth. The author processes the research data by transcribing the document, compressing the facts, then coding so that the conclusion is in the form of certain themes that can be grouped. From this research, the authors have succeeded in describing the main obstacles experienced by teachers in adapting and how they can overcome these obstacles in their way. This research shows that some of the obstacles for the geomatics engineering dual expertise program teacher in adapting to this skill competency are understanding new subject matter in the competency of geomatics engineering expertise, namely Geographic Information Systems (GIS) and Remote Sensing (RS) which are closely related to learning using *software* certainly. Inadequate facilities and infrastructure such as practical equipment for teaching and learning activities, lack of support from senior teachers in schools. The participants tried to overcome the obstacles they experienced with the shocking reality because they avoided teaching difficult subjects (subjects in Grade XI and XII) or tried to gain knowledge with senior teachers in school, even though not all senior teachers can provide support due to limited understanding of new material.

1. Introduction

The Dual Expertise Program (PKG) is a program designed to meet the shortage of vocational teachers in SMK. From the results of the calculation analysis, there was a shortage of productive vocational teachers of 91,861 people in 2016 (Direktorat Jenderal Guru dan Tenaga Kependidikan, Kementerian Pendidikan dan Kebudayaan, 2017). Geomatics engineering, as one of the skill competencies that the target of the dual expertise program, is experiencing a crisis of shortage of skill competency teachers due to a large number of retired teachers.

Previous research related to the dual expertise program discussed more the results of teacher competence after participating in dual expertise and whether there was a relationship between widya iswara (senior lecture) professional competence and learning achievement.o make the competence of dual expertise teachers to be even better, it is recommended to involve teachers in making teaching materials, mentoring internships in the industrial world, implementing debriefing and mentoring (Wahyudi, 2019). The relationship between Widyaiswara's professional competence and its relationship with the PKG education and training achievement (Karnasih et al., 2020)**.** Several studies with some of the concepts related to the implementation of the Dual Skills Program have been carried out. Relationships between nurses and colleagues (Johannessen, 2018). There is a mismatch between program planning and program implementation (Fresko & Alhija, 2009). This study is related to program design which sometimes experiences difficulties in its implementation in the field. The concept of learning is learning from experience, learning secretly about what is learned and what factors influence learning (Eraut, 2004). Forming professional novice librarians with less than a year of experience regarding their entity in the workplace (Frye, 2018), inclusion in the workplace is invaluable for creating a workplace where employees feel that they can perform their roles in their workplace freely (Miller, 2018).

Several studies are also related to the Dual Skills Program, namely the teacher induction program which also examines the relationship between school components such as the roles of school principals, senior teachers, and school climate. Induction programs for novice teachers by testing the mentor component (in this case senior teachers) in the implementation of mentoring activities in schools (Alhija & Fresko, 2010). The role of school principals selectively in the process of adapting new teachers to schools (Lusena & Demitere, 2015). Investigative research on the components of school climate (i.e. parent/community relationships, administration, student behavior values) and assessing their effects on emotional exhaustion, depersonalization, and low teacher personal achievement (Grayson & Alvarez, 2008).

Why this study is important? During the stakeholders (government) in formulating policies often did not see a comprehensive manner the requirements of teachers who will be included in a particular program, that often policies are made are not implemented properly and even generate problems in the middle of the road. Research on the adaptation of geomatics engineering teachers in dual expertise programs has never been done before. In this research, it will be possible to find out how the adaptation process for geomatics engineering teachers who participate in a dual expertise

program will get a reference in recruiting geomatics engineering teachers if the government implements a similar program in the future.The most perfect stage of adaptation is assimilation. The possibility of individuals changing the environment is very small due to the dominance of local cultures that control daily life (Kim & Gudykunst, 2005).

The best principal is a man who can create teachers to develop their potential well, therefore teachers must be in a good school climate. School condition has the effect of reducing teacher stress levels and fatigue personally and is useful for self-development in the future datang (Grayson & Alvarez, 2008). The companion teacher has a significant effect in mentoring new teacher activities. Initial findings indicate that there is a good implementation of the function of accompanying teachers (senior teachers) in schools (Alhija & Fresko, 2010). Subjects in the Geomatics Engineering Competency are mostly related to technology, it is necessary to involve teachers in training before transferring them to students (Korucu et al., 2011).

2. Methods

In a case study with a qualitative approach, the researcher understands and describes the events of human interaction in certain situations according to the perspective of the researcher which aims to comprehensively understand the subject under study by developing the concept of sensitivity to the problems it faces, the related realities and understanding of the phenomena that exist. Researchers must be able to dig deep and be sensitive and open to input from various parties so that the results obtained will be more complete and specific. A case study of 11 (eleven) participants (also known as informants) in this study were geomatics engineering teachers of dual expertise program who passed PPG (teacher professional education) at Yogyakarta State University (UNY). They were divided into two groups, namely Geomatics Engineering Teachers in Dual Expertises Program with educational backgrounds Civil Engineering or Building Engineering (have received basic Geomatics science) and a Geomatics Engineering Teacher with a Dual Expertises Program with an educational background in Physics and Chemistry (never got basic Geomatics science). The data obtained is based on the results of video call interviews on social media.

The researcher also as one of the informants of this study, the relationship between the researcher and the other informants is quite close, from 2017 until now we still frequently communicates through social media social contacts (WhatsApp). Researchers conduct interviews like talking to close friends. Researchers obtained the data by conducting a preliminary study via google form in October 2020 to find out the background of the participants, then starting in January making a Video Call with all the participants involved which was useful for further exploring the information.

Interviews were conducted through media applications social Whatsapp (Video Call) to get specific information about the experiences of teachers who passed the Dual Expertises Program for Geomatics Engineering Batch 2 of 2018 in adapting to the educational background of Civil

Engineering or Building Engineering, Physical Education and Chemistry Education to their new competency skills in the form of the constraints they feel to how they overcome these obstacles. Recording tools on social media were also prepared when conducting interviews. The test of the validity of the data carried out in this study was triangulation. To check the correctness of data or information, it is done by obtaining data sources from other sources such as second, third parties, and so on. The aim is to compare the information obtained from respondents and level of data confidence can be obtained to prevent subjectivity. Researchers present respondents, adaptation experts, and geomatics experts in a Focus Group Discussion *(FGD).* The FGD was conducted online because it was still in the period of the pandemic Covid-19.

3. Results and Discussion

An overview of the characteristics of the informants in this study can be seen in table 1 below.

Table 1. Characteristics informant (Data Source Research)

Informant Code	Gender	Background of first expertise	Reason taking Dual Expertise Program
IM1	male	Stone and concrete contruction engineering	Lack of class hours in first subject (first expertise)
IM2	female	Physical Education	Lack of class hours in first subject (first expertise)
ID3	male	Stone and concrete contruction engineering	Geomatics Engineering prospects in the future
IK4	male	Physical Education	Lack of class hours in first subject (first expertise)
IS5	female	Building Drawing Engineering	Lack of class hours in first subject (first expertise)
IS6	female	Physical Education	Lack of class hours in first subject (first expertise)
IW7	female	Chemistry Education	Lack of class hours in first subject (first expertise)
ID8	female	Building Drawing Engineering	School lack of teachers in Geomatics engineering
IT9	female	Stone and concrete contruction engineering	School lack of teachers in Geomatics engineering
IM10	female	Physical Education	Lack of class hours in first subject (first expertise)
IM11	male	PPKn	Initial certification is not linear with educational background

Source : Preliminary survey in October 2020

Participants consist of 4 males and 7 females with educational background : Civil Engineering, Building Engineering Education, Physical Education, and Chemistry.

3.1 Findings based on teacher background

- Less initial certification initial certification: Hours of tuition in Participants have a shortage of hours of study in subjects. Subjects that have reduced hours include physics and chemistry and there is also a change in subjects in new construction engineering skills competencies and concrete (IM01, IM02, IS06, IW07, IT09)
- Teacher shortages in geomatics engineering skills competencies: Competencies Geomatics Engineering lacks teachers because the existing teachers will retire shortly, the new geomatics engineering teachers are needed (IT09) Geomatics engineering teachers in schools are not competent to teach certain subjects in geomatics engineering KK such as GIS and PJ (IM10)
- Have basic skills in geomatics engineering: Participants have basic geomatics engineering knowledge that they have learned while studying at S1 Civil Engineering / S1 Building Engineering Education (IS05, IT09). Participants have an educational background of S1 Civil Engineering (even Masters in Civil Engineering), besides that the participants have attended training related to geomatics engineering (IM10)
- Geomatics engineering is a 'safe' skills competency: Geometics engineering is a safe skill competency. Participants do not need to be afraid of dangerous equipment (IM02). If participants take other KK such as Light Vehicle Engineering (TKR) or Motorcycle Engineering and Business (TBSM) it will be heavier to assume the responsibility because if they are not competent in that field (S06)
- Good prospects to be a geomatics engineering teacher in the future: Be a teacher in geomatics engineering has promising prospects in the future, for example, being able to take part in training in several institution, namely P4TK BMTI Bandung and PPPPTK BOE Malang, besides participant certification hours will be safe without any more interference (ID03, ID08)
- Initial certification does not have linearility with backgound education: Participant has Background D3 Civil Engineering background then continues his education to Bachelor's degree in Civil Engineering. Participant has been teachers of Pancasilaand Civics Education (PPKn) at a Junior High School (SMP) and took PPKn as their certification subject. This PKG is a way for participants to have linear certification with their educational background (IM11)

Learning problems will arise due to differences in different educational backgrounds. Problems that arise are: The existence of the gap of learning, adjustment capabilities, slow to accept learning, less focus on learning, the emergence of feelings of anxiety or fear because less capable of learning, the emergence of a lack of confidence, and laziness in learning (Setiyawan, 2018).

Participants with educational background in Civil Engineering / Building Engineering tends to more easily understand terrestrial survey subjects (one of the names of subjects in the Geomatics

Engineering Skills Competency) because when they study they already get basic knowledge of geomatics engineering, namely soil surveying. Meanwhile, for teachers with an education background in Physics and Chemistry, this subject is one hundred percent new to them, so it is only natural that teachers do not understand the basic concepts of Geomatics Engineering. This situation can be overcome by dividing into groups or classes, in which teachers with a background in Civil Engineering are differentiated by classes from teachers with a background in Physics Education and Chemistry Education. The subject matter given to teachers with a background in Physics Education and Chemistry Education will be deepened, so that they understand the basic concepts of Geomatics Engineering. So far, the government has always made policies from *top* to *down.* Do not see the perspective of the party getting the policy.

3.1.1 Adaptation of geomatics engineering teachers

There are teachers who adapt well, some teachers adapt poorly. Some teachers cannot adapt. The background is one of educational background. Teachers who adopt the best are those with a background in Building Engineering and Civil Engineering Education. However, there are also findings that there are teachers with a background in physics who can adapt well because they have a passion for computers. And there are also teachers with civil engineering backgrounds who are less able to adapt to the competence of geomatics engineering expertise, there is less enthusiasm in exploring material on Geomatics Engineering because they participate in a dual expertise program because they are afraid of losing their income in the form of teacher certification.

3.1.2 Three different perspectives on recruitment of dual skills participants

There are certain subject teachers due to the reduced hours of curriculum changes, in addition to the Geomatics Engineering KK in schools also experiencing a shortage of teachers while teachers also have other needs such as additional income, namely certification.

- Government perspective: Creating Dual Skills Program due to the urgent need for productive teachers nationally due to a shortage of productive teachers in several Expertise competencies.
- School perspective: Looking for vocational teachers in certain skill competencies, especially for geomatics engineering because there will be many teachers retiring shortly.
- Teacher's perspective: Teaches also need additional income in the form of certification. To make their income is not lost, they follow this PKG as a participant.

3.2 Constraints that are the main difficulties for participants in adapting as teachers in geomatics engineering competencies

3.2.1 Learning new material

New subjects, namely GIS and PJ are related to the use of software and computers so that participants find it difficult to learn and are not confident in providing the knowledge they have to students (IM01, ID03, IS05, IS06, IW07, ID08, IT09).

The 2013 Curriculum on the Geomatics Engineering Competency gave rise to several new subjects. Two of these new subjects are Geographical Information Systems (GIS) and Remote Sensing (RS). In the latest developments, both of these subjects use computers and software that are quite complicated in their learning, this is the main difficulty for PKG teachers in adapting.

In industrial revolution 4.0 era, the increase in the adaptability of prospective teachers in succession from the highest to the lowest level is: 1) adaptability to the environment in which the teacher is assigned 2) ability to adapt to self-conditions (self personal) 3) adaptability to technological developments by following per under their duties 4) Adaptability in terms of meaningful learning (Wistiawati et al., 2020).

We can read here, PKG Geomatics Engineering Teachers have difficulty learning new materials in Geomatics Engineering Competency Competencies related to computers and technological developments. Even though in the era of the industrial revolution 4.0, inevitably a teacher (not only in skill competency) geomatics engineering must be able to adapt to the times. However, science and technology will continue to develop according to the demands of the times.

3.2.2 Inadequate facilities and infrastructure

Schools have not received equipment assistance (equipment renewal) from the government for dozens of years so that practical activities in the field Students still use old and outdated equipment that is no longer used in the industrial world. (IM02) The school does not yet have computer laboratory facilities for geomatics engineering, only three computers are given to geomatics engineering, while other skill competencies that have computer laboratories such as Modeling Design and Building Information (DPIB) did not want to share (IM10).

To assist the implementation of teaching and learning activities, complete and adequate facilities and infrastructure are needed, especially in the competency of geomatics engineering expertise which is full of the latest technology. In this study, it can be seen how the relationship between the completeness of facilities and infrastructure with the adaptability of PKG teachers. Nearly half of the participants said that if the existing facilities and infrastructure in the competency of geomatics engineering skills are incomplete, this will affect the learning activities carried out by the participants at school.

3.2.3 Lack of senior teacher support senior

Geomatics engineering teachers do not support the adaptation of new teachers in schools. Communicating with senior teachers is difficult, senior teachers don't know what we are talking about (related to new subject matter such as GIS and PJ) (IM10) Certainly the participants do not know whether the senior teacher who is also the Chair of Skills Competency (KKK) is well received or not, personally, it is good, but there is no support, for example in learning that uses certain equipment, equipment that is not borrowed during practice, cabinets containing equipment that is always locked, cannot ask for measurement data (IM10). Science from senior teachers is still very old school ', so they cannot assist in learning new material in the geomatics engineering KK in schools, namely GIS and Pj ((IS05) subject matter.

Senior teachers are a place to ask new teachers in schools. There are schools whose senior teachers do indeed provide support to PKG teachers by transferring the knowledge they have, there are schools where senior teachers do not have sufficient competence, so they cannot m support PKG teachers. Some senior teachers are indifferent. Feeling that there is no need to support PKG teachers instead tends to complicate the process of adapting PKG teachers PKG teachers get maximum guidance from senior geomatics engineering teachers because:

- Senior teachers feel the need for teacher regeneration in Geomatics Engineering Competency
- Senior teachers are very happy with teacher enthusiasm PKG in gaining knowledge

Whereas Senior Teachers are not supportive because senior teachers also do not understand new subject matter such as GIS and Senses, so they are also unable to transfer their knowledge and experience to PKG teachers.

New teachers often adapt on their own, without help from related parties in the school (Lusena & Demitere, 2015). The attitude of the mentor (teacher assistant) when assistance is correlated with the implementation of the assistance as a good implementation at an early stage mentoring (Alhija & Fresko, 2010). Master tutors have contributed to the improvement of teaching skills students practice from the ability of medium level (before guided) into ability levels high (after being guided) because it is necessary to have a scheduled routine from tutor teachers to students who are practiced to improve the quality of their learning (Aji, 2018).

PKG Geomatics Engineering teachers are similar but not the same as new teachers in schools. The difference is that PKG Geomatics Engineering teachers have memorized the school environment while new teachers still feel all the new things at school. The adaptation process of PKG Geomatics Engineering Teachers should be easier because they already know their environment. However, not all of them can adapt to their seniors as easily as in terms of studying with senior teachers.

3.2.4 Studying equipment adjustment

Participants need to study equipment adjustments because the equipment changes its specifications so rapidly within a certain timeframe. , different specifications and brands of tableware will have different operating steps (IM11). Because they are not able to operate, the participants do not dare to use the equipment (IS05).

Science and technology in geomatics engineering are rapidly developing in line with the development of equipment used for practice in geomatics engineering KK. From the research results obtained, the average fulfillment of equipment on the skill competency of PKG Geomatics Engineering Teachers in SMK is very concerning. Some schools have not updated their equipment for more than fifteen years. Some schools receive equipment that does not meet specifications, so the equipment cannot be used. Besides some schools receive equipment assistance, but teachers in authentic competence cannot use the equipment. The main drawbacks of some schools are No Total Station, Unavailability of computer laboratories for Geomatics Engineering Skills Competencies.

The success of the learning process is determined by two things, namely 1) completeness of facilities and infrastructure in teaching in schools 2) strong motivation to teach teachers in transferring knowledge and teacher learning motivation in studying (new knowledge) (Sulfemi, 2020). As a new teacher in a new skill competency, PKG Geomatics Engineering Teachers will learn a lot of new sciences, new materials, the latest technology, new equipment. PKG teachers need to adapt a lot to all of these things. Some of the PKG teachers still have difficulty adapting to complete and adequate equipment, especially if the equipment is not there at all.

3.3 How to overcome obstacles that become participants' main difficulty in adapting

3.3.1 Avoiding self / choosing your own learning material

The answers of the most participants turned out to be shocking and this is the reality. Avoiding being asked to teach in difficult subjects and refusing to teach in class XI and class XII because giving knowledge to students cannot be part-time (we learn, learners learn) (IS05), (IS06). Less mastered subjects such as GIS and Remote Sensing are given to younger teachers because young teachers are still 'fresh' in terms of technology. For other subjects that are difficult to give to teachers who are able and willing to teach it (IM010) When teaching geomatics for the first time in KK, they take a lower class (Class X) to be taught first, have not yet dared to directly teach to a higher class. only gradually (IM1107014a, 7 January 2021). Being open to students if we are not able to provide certain lessons is better than avoiding ourselves when giving these lessons to students (IM02).

3.3.2 Learning and sharing with senior teachers

Learning with senior teachers to improve competency in geomatics engineering , especially in certain subjects which are controlled by the senior teacher (IW07, ID08) Participants say that senior teachers in participant schools come very well with the enthusiasm of KG teachers (meaning participants) in gaining knowledge. in geomatics engineering (ID08).

Some senior teachers do not provide curry support a limited knowledge, some senior teachers share with PKG geomatics engineering teachers because they think this PKG teacher is the one who will continue the 'struggle' to raise a geomatics engineering.

3.3.3 Participating in offline or online

Training Participants adapt to the competency of geomatics engineering expertise by following a lot of training, training followed by participants in offline and online forms (IT09). Participants wish to take part in training to get competent certificates in certain fields in geomatics engineering such as training to get an assessor certificate (ID08).

At the time of the Covid-19 pandemic, online training opportunities were wide open, although it did not rule out the possibility to get knowledge offline or face-to-face. The majority of participants improve their self-competence by taking offline or online training.

Generally, teachers with a background in civil engineering/building engineering try to improve their abilities/competencies by participating in online or offline training or training. Inversely proportional to teachers with a teaching background in Physics and Chemistry. Why do teachers not attend training, there are various reasons.

- Not teaching these subjects
- Still afraid of the ongoing pandemic
- Do not want to / don't like it (family reasons)

Continuous guidance is needed to have a positive impact on maintaining the quality of teachers in the learning process at school, so that teacher educators will continue to improve their quality with the professionalism they have to see their existing competencies (Permana, 2017).

By carrying out a structured and focused training program on their respective areas of expertise, it is proven to be able to increase the professional competence of teachers. This training program can be obtained by teachers by participating in Education and Training (Diklat) at competent institutions that have been tested by competent Widya Iswara (WI).

3.3.4 Looking for references by surfing the internet

Finding references for geomatics engineering material is not as easy as previously thought, the simplest way is surfing the internet, google searching (IK04, IW07, IS06, IM02, IM11) Participants

follow groups that are related to geomatic techniques that exist on social media and share with these groups if they have problems in terms of teaching materials (IM11).

One of the easiest ways for participants to experience material constraints and guidance in teaching on geomatic techniques is internet browsing.

3.3.5 Studying with alumni students who are already working or are currently undergoing education in the field of geomatics engineering

Participants ask for assistance with some subject matter (for example, installing certain software) from alumni of students who are continuing their studies in the same expertise as geomatics engineering (IS05).

3.3.6 Studying alone or private courses

TakingID03 self-taught learning certain equipment such as digital theodolite by involving students as assistants, for example, to hold measuring signs and so on. Participants dare to spend funds to buy expensive learning equipment such as drones personally with the assistance of their husbands because the husbands have the same educational background. Participants also took a private course with a professional on Geographical Information Systems (GIS) using ArcGIS software which is widely used in the industrial world (IM10).

3.4 Enthusiasm of geomatics engineering dual skills program teachers at new skills competencies

Participants are ready to devote themselves as teachers in Geomatics Engineering KK (ID08). Participants have started to get passionate about geomatics engineering (IT09). In the beginning, joining the geomatics engineering PKG at P4TK BBL Medan was still blank and still wanted to remain in the initial certification subject, but it seemed more and more interested and ready to dive into teaching geomatics engineering KK because it has a penchant for tinkering with computers so the material GIS and PJ related to the use of software and computers are not a significant problem (as are other teachers). The material in the Geomatics engineering KK can be followed in theory (IK04).

3.5 Student acceptance

When they first started teaching and introduced Geographic Information System (GIS) subject matter, students were very enthusiastic because the material had never been given by other teachers before (ID08). Students learn with enthusiasm, there are no meaningful problems when adapting to students. One of them is because students who are admitted to the Geomatics

Engineering KK have good input (at the time of admitting new students at the beginning of the school year (IT09).

Students accept the presence of PKG teachers to teach in Geomatics Engineering generally, especially when the teacher's ability PKG who can teach in GIS and Remote Sensing (PG) material.

3.6 School support

The school greatly supports the Geomatics Engineering KK by inviting guest teachers like professionals at a large company in the area to train and share the latest knowledge and technology in the field of geomatics engineering (IS06). There is no school support for the development of the geomatics engineering KK. Equipment has not been updated in more than fifteen years. If asked to the principal answered because of lack of funds (IM02). The school should not only act administratively but need to provide support for new teachers teaching new competency skills. The support provided by schools, for example, is the provision of equipment for practice, sending teachers to take part in training, and so on.

3.7 Implementation of the geomatics engineering dual skills program at P4TK BBL Medan

Widya Iswara who taught participants of the dual geomatics engineering expertise program at P4TK BBL Medan was incompetent (IK04) The knowledge gained during the implementation of the KG geomatics engineering program at P4TK BBL Medan was very insufficient, coupled with practical equipment which is inadequate so that if participants use scrambling equipment (IS06) The competency level of geomatics engineering lecturers at P4TK BBL Medan is questioned (IS05) When participating in the KG program at P4TK BBL Medan sees no Widya Iswara who is competent to teach PKG teachers in the field of geomatics (ID03).

Participants were very disappointed with the implementation when joining the Geomatics Engineering KG program at P4TK BBL Medan because the participants did not get any knowledge while the participants had sacrificed time and left their families. The government through the related director-general should be able to anticipate this problem from the start. For example, by moving the basic geomatics engineering training center to PPPPTK Bandung or PPPPTK Malang.

3.8 Technological development in geomatics engineering and its impact on teachers

Teachers must improve their abilities if they want to continue to develop, especially in the era of the industrial revolution 4.0, as currently, the development of science and technology in the field of geomatics is giving learning difficulties. For a geomatics engineering guru, adapting to technology is an absolute must. You don't have to expect the government, teachers must seek knowledge outside of school (ID03, IM01, IM10).

The findings of this research tell more about how the geomatics engineering PKG teacher views the advancement of science and technology which has the effect of influencing participants as 'prospective' geomatics engineering KK teachers.

3.9 Focus Group Discussion (FGD)

Confirm the correctness of the data obtained from the interview results. With two participants, namely ID08 and IM10, experts and supervisors. ID08 tells about his enthusiasm for being a teacher at the Geomatics Engineering KK as well as the support of senior teachers in adapting to the new skill competencies they have chosen. IM10 tells how the adaptation process is hampered by difficulties in communicating with senior teachers in schools, so IM10 must develop itself independently by learning independently and taking courses outside school hours for professionals.

The experts provided more input on writing discussion chapters and deepened the discussion further. Experts suggest that for an interview with one participant, the story description could be written down to pages. Qualitative research does not commonly use diagrams to provide an overview displaying the results of the data. Maybe it is possible to make certain tables, but specifically for data that is already strong, which will not change again, for example, data on participant education background or participant initial lesson certification data.

The most important thing about a teacher who begins to adapt to the new competency skills that he has chosen is the soft skills and fighting power of the teacher himself to develop the knowledge he is learning and give it to students. That is what is called a productive and efficient teacher.

4. Conclusion

Indonesian government has always made policies from *top* to *down.* Do not see the perspective of the party getting the policy. Some teachers can adapt well, are not good enough and Some teachers cannot adapt. One of the backgrounds is educational background. Teachers who adopt the best are those with a background in Building Engineering and Civil Engineering Education. There is a finding that teachers with a physics background can adapt well because they have a passion for computers. And there are also teachers with civil engineering backgrounds who are less able to adapt due to a lack of enthusiasm in exploring material on Geomatics Engineering, joining a dual expertise program for fear of losing their income.

The government has indeed prepared this dual expertise program by providing online and face-to-face training. However, specifically for Geomatics Engineering, it did not go well because the lecturers at the PPPPTK Medan who were in charge did not have sufficient competence. The government needs to change the basic level education and training policy in the field of Geomatics Engineering which is no longer compulsory in Medan but to move it to another more credible

PPPPTK. In the future, if the government plans to create a similar program, it must be more *bottom-up*. The government must see it from knowing the teacher's perspective so that the program created can run as planned. so that difficulties and obstacles experienced by teachers can be minimized.

This research carries a view *bottom-up*, the experiences experienced by these dual expertise teachers must be known and understood by policymakers, how to prepare teachers according to the desired perspective according to conditions in the field. If the government enters into a similar dual expertise program in the future it becomes a basis for consideration of teacher requirements for geomatics engineering expertise competency.

References

Aji, P. (2018). *Pengaruh Supervisi Pengajaran Pamong Terhadap Kemampuan Mengajar Mahasiswa Praktikan Profesi Guru Universitas Negeri Malang*. Malang: Fakultas Ilmu Pendidikan UM.

Alhija, F. N., and Fresko, B. (2010). Mentoring of new teachers : Correlates of activities and mentors ' attitudes. *Procedia Social and Behavioral Sciences* 2(2), 2497–2500.

Direktorat Jenderal Guru dan Tenaga Kependidikan, Kementerian Pendidikan dan Kebudayaan (2017). *Program Sertifikasi Keahlian Dan Sertifikasi Pendidik Bagi Guru SMA / SMK (Keahlian Ganda)*. Jakarta: Direktorat Jenderal Guru dan Tenaga Kependidikan.

Eraut, M. (2004). Informal learning in the workplace. *Studies in continuing education*, 26(2), 247-273.

Fresko, B., and Alhija, F. N. (2009). When intentions and reality clash : Inherent implementation difficulties of an induction program for new teachers. *Teaching and Teacher Education*, 25(2), 278–284.

Frye, J. M. (2018). Assimilation or Humiliation ? An Analysis of Professional Identities after Critical Events in the Workplace. *Research Journal of the American Association of School Librarian*, *21*(Britzman 2003), 1–27.

Grayson, J. L., and Alvarez, H. K. (2008). School climate factors relating to teacher burnout: A mediator model. Teaching and teacher education, 24(5), 1349-1363.

Johannessen, L. E. F. (2018). Social Science and Medicine Workplace assimilation and professional jurisdiction : How nurses learn to blur the nursing-medical boundary. *Social Science and Medicine*, 201(February), 51–58.

Karnasih, T., Nursetiawati, S., and Mahdiyah, M. (2020). Hubungan Kompetensi Profesional Widyaiswara dan Prestasi Belajar Guru Terhadap Hasil Uji Sertifikasi Kompetensi Guru Keahlian Ganda. *Syntax Literate; Jurnal Ilmiah Indonesia,* 5(5), 173-183.

Kim, Y. Y., and Gudykunst, W. (2005). *Adapting to a new culture. Theorizing about intercultural communication*. Sage Publications.

Korucu, O., Aktaş, C., and Katrancioğlu, S. (2011). Adaptation problems and attitudes of teachers towards technological material using in courses. *Procedia - Social and Behavioral Sciences*, 28, 311–315.

Lusena, I., and Demitere, D. (2015). Adaption Of New Teachers In Educational Establishments Of Liepaja City (Latvia). *Procedia - Social and Behavioral Sciences*, 197(February), 430–436.

Miller, M. J. (2018). *Inclusion and Assimilation : Including Change in the Workplace*. Portland: Portland State University.

Permana, N. S. (2017). Peningkatan mutu tenaga pendidik dengan kompetensi dan sertifikasi guru. *Studia Didaktika: Jurnal Ilmiah Bidang Pendidikan*, 11(1), 1–8.

Setiyawan, A. (2018). Problematika Keragaman Latar Belakang Pendidikan Mahasiswa Dan Kebijakan Program Pembelajaran Bahasa Arab. *Arabiyat : Jurnal Pendidikan Bahasa Arab Dan Kebahasaaraban*, 5(2), 195–213.

Sulfemi, W. B. (2020). Hubungan sarana Prasarana Sekolah dengan Motivasi Mengajar Guru di SMA Negeri Pamijahan Kabupaten Bogor. *Jurnal Ilmiah Edutecno*, 22(1), 1–19.

Wahyudi, D. J. (2019). Kompetensi Guru Keahlian Ganda Pasca Pelatihan. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 4(6), 821–827.

Wistiawati, A. T., Putro, S. C., and Irianto, W. S. G. (2020). Hubungan Sosial Kognitif dan Life Skills Education Terhadap Kemampuan Adaptasi Calon Guru Pada Era Revolusi Industri 4.0 Mahasiswa S1 PTE Jurusan Teknik Elektro Universitas Negeri Malang. *Jurnal Ilmu Pendidikan, Keguruan, Dan Pembelajaran*, 4(2), 88-97.