IMAGE: A MAP OF THE STARS OF THE ORION CONSTELLATION

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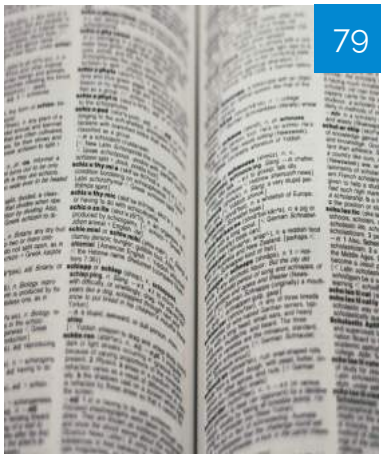

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Caleb Imbova Mackatiani & Sarah Naliaka Likoko

The University of Nairobi

ABSTRACT

The coronavirus (COVID-19) disease has affected the global community at an alarming rate. The pandemic affected regular business globally. Despite the role schools play in raising learners' skills, they had to be closed. To mitigate the impact of COVID-19 on education, the education sector should focus on the role of Massive Open Online Courses (MOOCs) in basic education institutions. In Kenya, MOOCs have been adopted in institutions of higher learning. However, there is no evidence of information technology being implemented in basic education institutions. The study examined the impact of COVID-19 on education. It also assessed the role of information technology as a communication mode in mitigating the COVID-19 pandemic. Furthermore, the study discussed online initiatives that are crucial in mitigating the impact of the coronavirus.

Keywords: coronavirus, schooling, trends, elearning.

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Caleb Imbova Mackatiani[α] & Sarah Naliaka Likoko[σ]

ABSTRACT

The coronavirus (COVID-19) disease has affected the global community at an alarming rate. The pandemic affected regular business globally. Despite the role schools play in raising learners' skills, they had to be closed. To mitigate the impact of COVID-19 on education, the education sector should focus on the role of Massive Open Online Courses (MOOCs) in basic education institutions. In Kenya, MOOCs have been adopted in institutions of higher learning. However, there is no evidence of information technology being implemented in basic education institutions. The study examined the impact of COVID-19 on education. It also assessed the role of information technology as a communication mode in mitigating the COVID-19 pandemic. Furthermore, the study discussed online initiatives that are crucial in mitigating the impact of the coronavirus. The study was guided by e-learning theory as advanced by Richard E. Mayer, John Sweller, and Roxana Moreno in 2015. A mixed-method approach was used in the study. A study sample of 384 was drawn to conform to the confidence interval of 0.05, a confidence level of 1.96, and a standard deviation of 0.5. Regression analysis was used to test the hypothesis of the study. The study findings might be significant stakeholders for the actualization of e-learning in schools.

Keywords: coronavirus, schooling, trends, elearning.

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Objectives

- Examine the impact of Coronavirus on Education.
- Assess the role played by schools.
- Discuss online initiatives that can mitigate the impact of the Coronavirus

Hypothesis

Ho: Massive Open Online Courses do not significantly mitigate the impact of COVID- 19 on Education.

I. INTRODUCTION

A novel coronavirus, known as COVID-19, is reported to have originated in Wuhan, China, in December 2019 (Huang *et al.*, 2020). According to Pokhrel and Chhettri (2021), the global outbreak of the COVID-19 pandemic has spread worldwide, affecting almost all countries and territories. The World Health Organization (WHO) declared COVID-19 a pandemic on March 11th, 2020. Thus, a global emergency is impacting the entire world population, the economy, and education is no exception. The novel coronavirus is a new strain of Coronavirus that has not been previously identified in humans. It spreads like wildfire, and the global rate of infection is high. With the upsurge of the virus, the World Health Organization (WHO) declared the virus a pandemic. Besides, WHO came up with strategies on how to deal with the COVID-19 pandemic. Social distancing and wearing face masks were crucial since the virus spread through saliva droplets. Hand-washing was also identified as being more appropriate since handwashing with soap or sanitizer dissolves the virus. Leading pharmaceutics companies in developed countries embarked on the development of vaccines to

counter the pandemic. Although Pfizer, Moderna, AstraZeneca, Johnson & Johnson, and sputnik V vaccines have been developed for COVID-19, it is unclear whether all countries will access them.

Vaccines are currently administered to people in developed countries and a few developing countries. Despite the efforts to develop vaccines for COVID-19, a new variant has been discovered in the U.K., Nigeria, the U.S., and 11 other countries (University of Edinburgh, 2021). The variant, B.1.125, contains a mutation in the virus's spike protein. The mutilation is also present in the variants that have been found in South Africa and Brazil. Another variant, B.1.1.7, has been identified in the U.K. The variants bind and enter human cells. Also, the viral variants from South Africa, the U.K., and Brazil are more contagious. Subsequently, the new variant is a threat as current E484K vaccines might not be effective. Besides, by January 2021, the Delta variant was identified in India. It is more contagious and has a high transmission rate globally, so it has become a concern. WHO is closely monitoring and tracking the variant.Various countries have demonstrated the variant. Africa, and specifically Kenya, has not been spared. The increased transmission rate of the Delta variant is due to social mixing, increased social mobility, and the inappropriate use of public health and social measures.

Since March 2020, COVID-19 has spread at an alarming rate in sub-Saharan Africa. Half of the countries in this region are experiencing community transmission of the virus. COVID-19 has also become asymptomatic.Asymptomatic means a condition where a victim does not show disease signs. Most COVID-19 positive cases do not show signs of COVID-19. Globally, by July 2021, about 193 million people had been infected. Besides, around this period, the virus killed 4.14 million people all over the world. Sub-Saharan Africa has recorded a caseload of 2.86 million positive COVID-19 cases by July 2021. Also, 14,956 people in sub-Saharan Africa succumbed to death by May 2020. On March 13th, 2020, a traveler from London was diagnosed with the first positive COVID-19 case in Kenya.As of April 27th, 2020, there were 363 confirmed cases, 114 recoveries, and 14 deaths (12 males and 2 females) in Kenya. There is sustained local transmission, accounting for 58% of all cases, while 42% are imported. At first, Nairobi was the epicenter of the epidemic, which has now spread to 12 more counties, with Nairobi and Mombasa leading with 235 cases and 93 cases, respectively. More males were infected (56%-198) and most of the confirmed cases were asymptomatic (71%–251) (Nanyingi, 2020). Since then, the country has recorded 195,801 positive cases and 381,041 deaths by July 2021. Also, the country fell short of the supply of testing kits for COVID-19. This is an indication that the COVID-19 testing levels are low.

To mitigate the spread within the country, typical business activities had to be halted, including: mandatory quarantines and a countrywide night curfew, closure of clubs, restaurants, and non-essential businesses, suspension of international flights, partial lockdowns in five hotspots (Nairobi, Mombasa, Kilifi, Kwale, and Mandera) and the closure of international borders (Pravat, 2020). In addition, public service announcements emphasize policies such as social distancing, working from home, a ban on public gatherings, and fewer passengers in public vehicles. Moreover, educational institutions were closed despite the crucial role schools play in raising learners' skills. Researchers view site attendance or face-to-face contact as essential in increasing children's social skills and social awareness. Studies have revealed that schooling has significantly impacted the improvement of students' scores on tests. Besides, economists consider school attendance crucial for the development of a child's productivity ability. But COVID-19 has interrupted learning in schools. Schools closed down due to the COVID-19 outbreak. The effect negatively impacted regular school attendance. Kenya had to adopt strategies identified by WHO to respond to the impact of the coronavirus. Social distancing, the wearing of face masks, and handwashing were to be observed.

However, in Kenya, schools lack adequate physical facilities to respond to social distancing. Schools also lack sufficient water points that can mitigate the effects of the virus. According to UNICEF, Kenya (2020), 59 percent of Kenyans

have access to clean water.Sustainable Development Goals numbers 6 and 4 aim at the accessibility of adequate water, sanitation, and hygiene (WASH) facilities in schools. The availability of WASH contributes to an improvement in access to education and learning outcomes (UNICEF, 2018). This implies that quality education and mitigation of COVID-19 cannot be realized in schools in Kenya. It is therefore difficult for schools without water resources to have handwashing facilities. Besides, most schools are understaffed. There is an acute shortage of teachers in Kenyan primary and secondary schools. Kenya, like any other developing country, has a weak economy. Her economy cannot support the provision of masks to all the students. Also, Kenya has not come up with a legal policy on the coronavirus and education. Besides, the Kenya Institute of Curriculum Development (KICD) is mandated to develop a school curriculum. KICD is also required to build curriculum support materials for basic and tertiary education in Kenya. In contrast, there are no curriculum support materials that have been developed for online learning. The only support materials developed are radio and T.V. education programs. The programs are media support materials for learners meant for reinforcement of learning. We are now in a world that requires new approaches to learning.

II. STATEMENT OF THE PROBLEM

Globally, COVID-19 has impacted negatively on all sectors. Kenya has put in place several precautionary measures to mitigate the pandemic in its early stages, including lockdowns and dusk to dawn curfews (Aluga, 2020). The pandemic has affected regular business transactions in Kenya. Schools had to close down in March 2020 and reopen in January 2021. Though students are on vacation, it is not clear whether schools will reopen. Therefore, COVID-19 has ushered in a new era in the schooling system. There is a need for a paradigm shift in the field of education and communication technology. Pedagogy should mitigate the negative impact of COVID-19 on education. Information technology is aimed at promoting learning through the internet. In 2018, the government of Kenya delivered laptops and tablets to primary schools to enhance digital learning. A few secondary schools are equipped with information and communications technology (I.C.T.) equipment. Despite this, there is a minimal presence of information technology in primary and secondary schools. Therefore, this study investigated the role of information technology in mitigating the negative impact of COVID-19 in primary and secondary schools in Kenya. With the increase in the use of online modalities during COVID-19, it is necessary to assess their effectiveness regarding teaching and learning from various stakeholders.

III. IMPACT OF CORONAVIRUS PANDEMIC

China was the first country to detect COVID-19 disease in the city of Wuhan in December 2019. After that, the disease spread like wildfire. WHO declared the COVID-19 outbreak as a pandemic in March 2020. After that, COVID-19 spread like a Manhattan fire across the world at different levels. As of December 24th, 2020, globally, the pandemic had infected 79.3 million people. 1.745 million patients had succumbed to the disease, and 44.7 million patients had recovered. The United States of America is leading the way with 18.7 million infected cases and 329,000 deaths. India had 10.1 million infected cases and over 147,000 deaths. Brazil had 7.37 million infections and over 172,000 deaths. Russia had 2.91 million reported cases and 51,810 deaths. France reported around 2 million positive cases and over 50,000 deaths. Spain reported over 1 million infected patients and 44,000 deaths.

In Africa, the first COVID-19 cases were reported at the beginning of February 2020. As of December 24th, 2020, Africa had reported over 2 million positive cases of coronavirus. South Africa recorded over 954,000 infected cases and over 25,000 deaths. Besides, Egypt experienced over 130,000 infections, 7,209 deaths, and 108,000 recoveries. Also, Ghana identified 54,043 illnesses, 52,777 recoveries, and over 333 deaths. Similarly, Nigeria confirmed 80,922 disorders, 69,274 recoveries, and 1,236 deaths. Furthermore, Uganda reported 32,399 infections, 10,731 recoveries, and 245 deaths. And Rwanda reported

7,598 illnesses, 6,163 recoveries, and 66 casualties.

The COVID-19 pandemic has overwhelmed advanced health care systems all over the world. Sub-Saharan Africa has been adversely affected by the pandemic because it has weak health and social services. Despite this, sub-Saharan countries acted swiftly to implement travel bans, self-quarantine, ban social gatherings, and close schools. These preventive measures aided sub-Saharan Africa in combating the spread of COVID-19. Economically, various regions were affected to varying degrees by the pandemic. The real gross domestic product growth for the three largest economies (Nigeria, Angola, and South Africa) was projected to fall. The projection was a result of persistently weak growth and investment. The West African Economic and Monetary Union's two economic blocs and the East African Community would also fall. This is due to weak external demand, disruptions to supply chains, and domestic production. Besides, the tourism sector was expected to contract due to travel bans.

A COVID-19 patient in Kenya was first diagnosed on March 13th, 2020, and there has been an upsurge in numbers across the country. Currently, there is a third wave in Kenya. Although the AstraZeneca vaccine has been imported into the country, the new COVID-19 variant is already in Kenya. As of March 2021, Kenya had reported 15,196 confirmed cases of COVID-19. The positivity rate stood at 22%. Patients who succumbed to the disease at this time were 2098. These cases are spread all over the 47 counties of Kenya. This has led to the declaration of the second lockdown in Kenya. The first lockdown was on March 15th, 2020. The pandemic has affected the economic, social, transport, health, and education sectors. Reduced business activities, unemployment rates, traveling, and social gatherings have been restricted. These effects have been felt across all sectors. In Kenya, the field of education has been seriously affected by the outbreak of COVID-19. The school calendar has been interrupted, and over 18 million students are involved.

Primary and secondary school pupils had to be sent home. With the anticipation of third and fourth waves, it is not certain whether regular schooling will persist. As onsite teaching is being interrupted, learners and teachers are unprepared for the new situation. It poses a unique set of challenges in the teaching-learning process.

3.1 The School's Role

School plays a significant role in every person's life and a child's development. School is therefore crucial for the socialization of children. Schools introduce not only fresh concepts to children but also social behaviors for learners. They prepare students to contact other individuals to meet their expectations. The role of school in life is to promote interest and empower individuals to become successful individuals. The expansion of the new education system is similar to the development of our society. It is well established that learning is essential in defining one's personality and coping with life circumstances. Besides, Lavy (2015) notes that contact hours in school promote learning achievement. This is an indication that schools play a crucial role in the linkage of book literacy and experience. A school is a fountain of knowledge for children. It exposes children to the possibility of various fields of education that contribute to increasing learners' thought processes. Besides, schools play a crucial role in human development. Through communication, children are exposed to new ideas. Schools have structures that promote a schooling culture. This implies that children can develop academically and, subsequently, support society. The child is, therefore, able to participate in community services.

School also helps one to appreciate other people's ideas and traditions. They stress an educational culture that promotes math, reading, writing, science, and social studies. Public schools generally follow this educational model, although charter schools can offer a more flexible educational approach. Yann, Cahuc, and Shleifer (2013) were concerned with school teaching practices that affect student beliefs. The concern is in support of progressive education that promotes social capital. Although schools are

crucial in transforming children's lives, there are other options for schooling. Traditional schools' alternatives operate outside the school's jurisdiction. The other options include homeschooling and online learning. Some factors come into play when choosing an alternative school. The components revolve around educational programs, the social environment, and the availability of support services.

Traditional learning was interrupted with the outbreak of COVID-19 in March 2020. The government of Kenya had to adopt a remote and digital mode of learning. Although in 2019, there was a launch of a 24.6 billion laptop project, the gadgets were not supplied to all schools. Besides, they were too expensive and could not bridge digital learning in Kenyan schools. Students don't have smartphones that can be used for online learning. There were also challenges around connectivity and reliable electricity. Remote learning has also faced challenges due to a lack of well-defined infrastructure and equipment. Digital expertise was also a problem. Most of the teachers are digitally illiterate. As a result, there was minimal learning in rural areas and informal urban settlements. There is a need for Kenya to redress these challenges and ensure continued education during the COVID-19 pandemic.

3.2 Protocols for Implementing COVID-19 Curriculum

According to Cahapay (2020), educational systems are likewise preparing for the COVID-19 era characterized by the "new normal." This expression first emerged in the field of business. It was used to caution economists about the beliefs of economists that industrial economies would revert to normal after the recession (El-Evian, 2010). The term has since been used in different contexts to mean that something previously not typical has become typical. It substitutes for the habitual, usual state after a particular event (Platinos and Shinis, 2020).

In the educational dimension, extensive research has discussed the adoption of online modality in instructional implementation in the new normal of the COVID-19 era (Naciri *et al.*, 2020). In addition, researchers and international organizations have studied the effects of school closures on students' learning and found a measurable loss in acquiring basic skills, particularly for the most disadvantaged children (Quinn *et al.*, 2016; Cattaneo *et al.* 2017). It is on this line that the current study will establish the COVID-19 pandemic and its dramatic long-term effects on students' competencies and increase in educational inequalities.

Before the COVID-19 pandemic, in-school learning had already been proven to be more effective than distance learning. Furthermore, student outcomes resulting from online learning are poorer, on average, than outcomes resulting from face-to-face instruction (Heppen *et al.*, 2017). Conditions for effective remote learning, such as good internet connection, clear explanations, scaffolding, and feedback from teachers, are not easy to achieve. Combining a digital gap with teacher inexperience in providing high-quality distance learning makes it difficult to improve students' learning opportunities. Moreover, there is now a significant risk that vulnerable students have less access to quality teaching than their peers, widening the attainment gap due to the school lockdown (Coe et al., 2020). These emerging discussions regarding education in the new standard COVID-19 era could be reconsidered through the lanes of curriculum implementation. Considering the approaching regular COVID-19 periods, a rethinking of education within the curriculum implementation perspectives is essential. Curriculum implementation should take into account the goal, content, approach, and evaluation.These will inform educators of the critical challenges, decisions, and solutions that must be contently considered as the new era is approached. As COVID-19 brings forth various restrictions, a new standard curriculum may also adopt content integration. This approach gears towards reducing the number of hours spent on all the subjects while still addressing the curriculum expectations. This strategy will enable the assimilation of curriculum content expectations from various topics in designing instruction (Romano et al., 2012).

3.2.1 The Educational Trend of Massive Open Online Courses

UNESCO is a U.N. agency that is mandated to cover all aspects of education. UNESCO advances the idea that education is a human right for all. It further emphasizes access to quality basic education. This has been done through sustainable development goal number four. UNESCO has come up with four trends that are crucial in education. These trends include neuroscience, massive open online courses (MOOCs), Blockchain technology, and population growth. The trend of MOOCs is relevant in mitigating the effects of the coronavirus. Oxford dictionaries online refer to MOOCs as a program offered online at a minimal cost to people who decide to log on to the website and sign up. The proponent of the term "MOOC" is Dave Cormier (Wikipedia, 2015). It described the Connectivism and Connective Knowledge courses delivered by George Siemens and Stephen Downes in 2008. It was an online course that was offered free to over 2000 people. "M" stands for "Massive." A MOOC is massive because it attracts many participants at the same time. For example, the University of Edinburgh's E-learning and Digital Cultures course enrolled over 40,000 students. The participants came from various parts of the world. The potential of Massive Open Online Courses (MOOCs) is being actualized in higher education across the globe (Rambe & Moeti, 2017). This is an indication that it is higher education institutions that operationalize MOOCs.

The first O stands for "open." Learners are drawn from various geographical regions (Rodriguez, 2012). According to Dave Cormier, the MOOC is accessible, and participation is free. The work is shared among all the participants. Hence, it is open to all. This implies that MOOCs do not have prerequisites or tuition fees. The second O is for online. It refers to a mode that is offered through the internet. MOOCs feature a course structure, or the "C" in "MOOC," meaning pre-arranged learning experiences. Grimmelmann (2013) refers to the pre-arranged experiences as a series of checkpoints and deliverables integrated into the instructional design. The design accommodates an expert who transmits pre-defined content to the learners. The participants then analyze the debate and generate content of their own. The content is also sourced from peers. The trend of MOOCs is the latest in online learning. They are crucial for eLearning professionals who want to keep up-to-date with the latest trends in education. MOOC enrollment grew from 3.6 million in 2012 to 9.7 million in 2013 (NUTN, 2014).This implies that MOOCs can target a large number of learners. However, tracking the target audience is critical. Issues of course management ought to be addressed. Teachers should analyze to facilitate tracking of learners' performance and intervene accordingly. This process generates valuable data that helps facilitators make decisions about the improvement of the course.

In MOOCs, the administrator should consider the instructional strategy to be used. The audience is significant, and the teacher should address the individual learners' needs. Facilitators should apply good pedagogy to MOOCs. The pedagogy offered should be for self-study or instructor-led. Therefore, facilitators should use both synchronous and asynchronous approaches in MOOCs. The strategy will involve online interactive presentations, the sharing of slides, and other resources. Learners should also be allowed to communicate amongst themselves. In light of this, Gillani & Eynon (2014) note that learners are encouraged to participate in discussions to support one another. Failure to interact leads to low completion rates in MOOCs (Lackner & Kopp 2014). Besides, Jordan (2014) revealed that the completion rate was as low as 0.9% in MOOCs. In this respect, interactive activities are critical. Although the strategies of most MOOCs are usually asynchronous, some cases may also include synchronous features, such as interactive live chats. MOOC content usually involves uploading online content of various types, like interactive flash-based presentations. MOOC developers also have the opportunity to upload their videos. This consists of uploading recorded lectures, which can be for MOOCs. Another pedagogical approach that is ideal for MOOCs is constructivism. Constructivism is based on the premise that students are responsible for their learning. Mackatiani et al (2018) applauded these approaches as being learner centered.

Therefore, instructional approaches for MOOCs are based on knowledge gained by doing activities. The activities promote interaction within the MOOC content. Through online activities, the design engages learners in problem-solving and decision-making activities. These activities promote learning.

Assessment is also very critical for MOOCs. The massive aspect of MOOCs has implications in terms of evaluation. For an assessment to be conducted, issues of authentication and proctoring are critical (Sandeen, 2013). It is essential for the person who has completed the course to be assessed. Also, the same person who enrolled in the system should be the one to be evaluated. Formative assessment is crucial for MOOCs. Brief questions offered throughout the course appraise learners. Besides, facilitators keep track of learners' progress on the spot. Facilitators can therefore proceed to remedial action in the form of feedback. Also, the presence of the facilitator can motivate learners and significantly reduce dropout rates. Due to the large number of participants, facilitators should stick to closed-ended questions. The MOOC system can automatically grade these questions. The process allows the MOOC course facilitator more time for other services, such as tracking learners' progress. Besides, the teacher can give feedback on group activities. Also, improvements to the MOOCs can be adjusted accordingly. The other implication is that, being online examinations, they should start and end as stated. After the assessment has been conducted, accreditation has to be considered. However, NUTN (2014) notes that there is no system of credit recognition among MOOC platforms. This implies that examinations administered on MOOC platforms cannot be used for accreditation purposes.

Since the first inception of MOOCs in 2008, accelerated development of the courses has been manifested in research in the higher education sector (McAuley et al., 2010). Research activities and studies were concentrated in the developed economies. In sub-Saharan Africa, enrollment of MOOCs in tertiary education has grown by 8.6% annually over the last four decades (Rambe and Moeti, 2017). With the introduction of the African Virtual University (A.V.U.) in 2009, dedicated to providing Africans with access to high-quality education through online learning, there was slow progress due to technology constraints. In line with the vision of the African Virtual University and the overall educational objectives, S.S.A. adopted open online courses. The Southern Sub-Saharan countries that have adopted MOOCs include South Africa, Nigeria, Kenya, Rwanda, and Tanzania. This is as a result of the respective government's initiative to invest in education.

In Kenya, Jobe (2013) reported the design and development of quasi-MOOCs as a means of open educational resources and teaching and learning platforms for teachers and students across the educational strata in Kenya (i.e., primary, secondary, and universities). The objectives of the "Kenyan Cloud School" are the contextualization of subjects. To provide each subject taught in the schools in English and Kiswahili through the quasi-MOOCs and strictly adhere to the existing approved secondary curriculum in Kenya Learning. Combining learning aspects from the different MOOC types, such as structured lectures, interaction, and open resources, enhances learning value.

MOOCs use a mixed approach that combines constructivism, social learning, and connectivism to actualize knowledge. Constructivism assumes that students are responsible for their learning. Therefore, the premise is based on understanding by doing activities. During the COVID-19 era, MOOCs were consequently ideal.

3.3.2 The Difficulties of Implementing Massive Open Online Courses

In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic, posing a contemporary threat to humanity (Olasile & Emrah, 2020). Merriam-Webster Online Dictionary (2020) referred to the pandemic as "an outbreak of a disease that occurs over a wide geographic area and affects an exceptionally high proportion of the population." This pandemic forced the global shutdown of several activities, including the suspension of face-to-face learning. In this regard, there were around 1.6 billion

learners across 194 countries, accounting for more than 90% of total enrolled learners affected by school closures due to the pandemic (UNESCO, 2020). The sudden closure of schools pushed learning institutions to migrate to online platforms to guarantee children's right to education. However, Ribeiro (2020) indicated that the digital transformation of instructional delivery came with several logistical challenges and attitudinal modifications.

School closures produce unequal learning opportunities in formal and non-formal education for children and young people from different socioeconomic backgrounds. In Kenya, during COVID-19, the instructional time received by students from different social backgrounds has been unequal, as has the educational value of the activities developed at home in non-school time. These unequal opportunities, in turn, are likely to exacerbate existing inequalities in skills acquisition and academic performance. School closure, even when distance (remote) learning is offered, usually implies a reduction in instructional time and, consequently, a decline in learning time (World Bank, 2020). Despite the efforts to support remote learning, many students have not had access to it. Existing data about the digital gap and surveys conducted during the lockdown indicate that teachers have been unable to contact a significant number of students (Kuhfeld et al., 2020).

Additionally, financial constraints negatively impact the implementation of e-learning. The government of Kenya has set aside 17 percent of the annual budgetary allocation for education. The funding is inadequate. Huynh et al. (2003) noted that budgetary restrictions are a concern for educational institutions. Therefore, lousy financing of education cannot promote e-learning. As a result, institutions are unable to carry out all necessary e-learning activities.According to ESIB (2014), institutions that offer e-learning must provide adequate technological infrastructure. Thus, for effective e-learning, the availability of computer labs and computers is crucial. Similarly, Kibuku, Ochieng, and Wausi (2020) indicate that the delivery of e-Learning depends on a flourishing I.C.T. infrastructure. Therefore, e-learning infrastructure is a significant concern in primary and secondary schools in Kenya.

Besides provision of adequate technological infrastructure, network connections and technical support for both students and staff are also important. However, internet bandwidth has hampered e-learning. According to the MoE (2013), bandwidth was $160 per Mb/s in developing countries. Subsequently, the cost of internet bandwidth is very high for primary and secondary schools. Basic institutions cannot afford to procure adequate internet bandwidth. With this, it has made remote learning close to impossible, especially for marginalized areas. This has further resulted in slack in the implementation of online learning. Stage et al. (2020) point out that the shift to remote learning exacerbated the dropping out of underserved students from online instruction due to lack of bundles, network challenges, and having a caregiver affected by the economic impacts of the COVID-19 pandemic.

On the other hand, operational e-learning policies are crucial in implementing e-learning (Nyerere, 2016). The functional or dysfunctional policy framework determines whether or not e-Learning initiatives will fail or succeed. For example, Catherall (2005) established that schools don't have I.C.T. and e-learning policies of any sort in Kenya. Similarly, the Government of Kenya Sessional Paper of June 2012 on the Policy Framework for Education and Training also admitted that. However, the Sessional Paper No. 1 of 2005 mentioned an e-Learning policy, and such a policy framework was still absent seven years later. However, the 2012 Sessional Paper drew up an e-Learning policy framework to guide practice in the country from the year 2012 onwards as we advance, though these guidelines have largely remained unimplemented at the national level to date. Therefore, e-learning policies are a challenge in basic educational institutions. Furthermore, it appears that the Ministry of Education does not have a clear and operational e-learning policy for both primary and secondary schools.

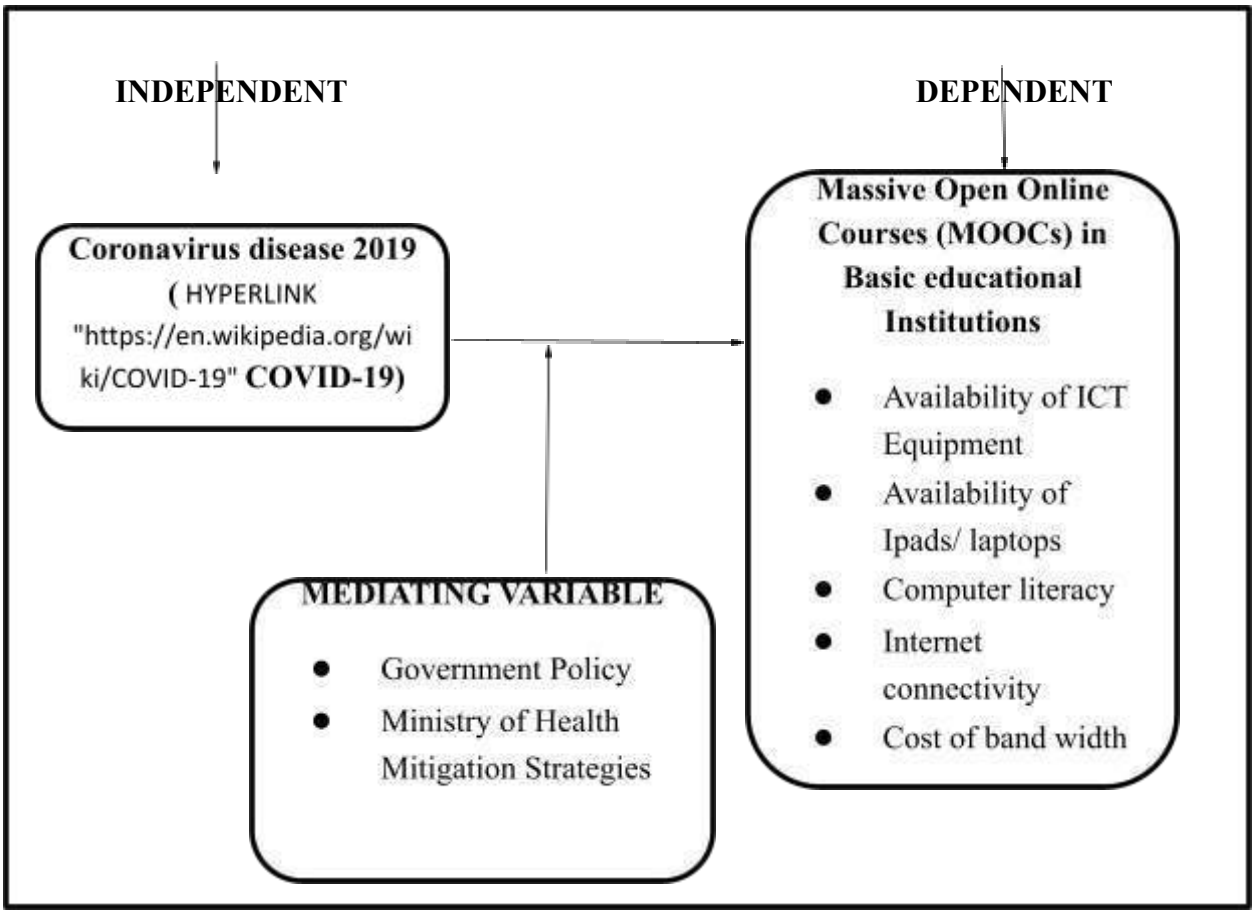
IV. THEORETICAL CONTEXT

The study was guided by e-learning theory built on cognitive science principles that demonstrate how the use and design of educational technology can enhance effective learning (David, 2015). The theory outlines cognitive science principles that describe how electronic educational technology is used and designed to promote effective learning (Sweller, Van Merrinboer & Paas, 2019). Mayer, Sweller, and Moreno (2015) recommend using imagery to convey non-linguistic visual information and simultaneous audio communication for linguistic communication. They advanced that channeling linguistic information through audio while concurrently showing non-text imagery is very effective. The split-attention effect suggests that a single modality should not convey multiple streams of data simultaneously. Therefore, using the audio system for verbal information and the visual design for imagery is more efficient. These cognitive principles apply to e-learning.

The theory is applicable to this study as it suggests combining media to facilitate learning. Therefore, the approach is more effective in e-learning. If these two principles are followed, there is efficiency. The proponents of e-learning revealed that words go better through the ears and images go better through the eyes. Hence, e-learning is more compliant as certain combinations of media facilitate learning more effectively. Besides, e-Learning is not applicable during onsite learning.

V. CONCEPTUAL FRAMEWORK

The researcher conceptualized the independent, dependent, and intervening variables as shown in Figure 1.1



Source: Author (2021)

Figure 1.1

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VI. METHODOLOGY

This study adopted a mixed-method approach. The method incorporated both quantitative and qualitative analysis of data. The study's target population included headteachers, teachers, and students in primary and secondary schools in Kakamega County, Kenya. Kakamega County has 12 sub-counties that accommodate 250 secondary schools and 850 primary schools. A target population of 1100 head teachers, 12,000 teachers, and 90,000 students was realized from these schools. Thus, the target population was 913000. The target aimed to access respondents who had information about information technology. The study sampled primary and secondary schools at a ratio of 3:1 per sub-county. The ratio translated to a sample size of 384 respondents (12 secondary headteachers and 36 primary headteachers; 2 teachers (one male and one female per school), leading to 24 teachers in secondary schools and 72 teachers in primary schools; and five students per school (60 secondary students and 180 primary students) was drawn to conform to the confidence interval of 0.05, a confidence level of 1.96, and a standard deviation of 0.5. The study objectives contributed to the collected data. The quantitative and qualitative responses of respondents were analyzed. The data led to the coding of the information that was collected. The coded data was entered and analyzed using the statistical package for social sciences software (SPSS version 20) to analyze the data. Qualitative data was classified according to the study variables (class size, attitudes, and competencies). The Cronbach's alpha test of variable reliability of the relevance coefficient at 0.67 (Virginia University, 2016) was used. Descriptive statistics were summarized into means, regressions, and frequencies. Tables and graphs were used to present the findings. Regression analysis determined the relationship between the independent variables of information technology and the dependent variable of learning achievement.

VII. THE SIGNIFICANCE OF THE STUDY

The Ministry of Education is committed to the provision of quality, equitable, and inclusive education to all students and learners across the country. The right to education for all Kenyan children is strongly stipulated in the Constitution of Kenya, 2010. However, the Corona Virus Disease in 2019 (COVID-19) has a significant barrier to effective learning across the nation. Therefore, the study might be substantial to Kenya and sub-Sahara Africa as policymakers would use the findings on how to formulate educational policies to redress the impact of the coronavirus on education. In addition, education policy implementers might use the study to actualize e-learning in schools. The study might also contribute to the literature on coronavirus and education and thus be of value to scholars and researchers in comparative and international education.

VIII. RESULTS AND DISCUSSIONS

This study interrogated initiatives that mitigate the impact of COVID-19 on education in basic education institutions in Kenya. The following objectives guided the study: to examine the effects of the coronavirus on education, assess the role of schools, and discuss online initiatives that can mitigate the impact of the coronavirus.

The first objective sought to establish the effect of COVID-19 on education. The study sought the views of the headteachers, teachers, and students. Their perceptions are captured in Table 1.

Table 1 Headteachers', Teachers' and Pupils' Views on Impact of COVID-19

Attendance	Primary schools						Secondary schools					
	head teachers		Teachers		pupils		headteachers		Teachers		Pupils	
	n	%	n	%	n	%	n	%	n	%	n	%
Negative	36	100	72	100	180	100	12	100	96	100	96	100
Positive	0	0	0	0	0	0	0	0	0	0	0	0
Total	36	100	72	100	180	100	12	100	24	100	60	100

The data contained in Table 1.1 revealed that 100 perc noent of headteachers in primary schools indicated that COVID-19 negatively impacted Education. Another 100 percent of the headteachers in secondary schools showed that COVID-19 negatively impacted Education. Also, 100 percent of teachers in primary schools indicated that COVID-19 negatively impacted Education. Another 100 percent of the teachers in secondary schools showed that COVID-19 negatively impacted Education. Besides, 100 percent of pupils in primary schools indicated that COVID-19 negatively impacted Education. Another 100 percent of students in secondary schools showed that COVID-19 negatively impacted Education.

Further findings from Table 1.1 revealed that none of the headteachers, teachers and students from primary and secondary schools showed that COVID-19 positively impacted Education. Overall, all the respondents noted that COVID-19 negatively impacted Education. This implied that onsite learning had been interrupted.

The second objective sought to assess the role played by schools**.**To determine the role played in schools, the study sought views from the headteachers and teachers. Their perceptions were captured in Table 1.2

Table 2: Perceptions of Headteachers and Teachers on the Role of Schools

Importance	Primary schools				Secondary schools			
	Head teachers		Teachers		Head teachers		Teachers	
	n	%	n	%	n	%	n	%
Crucial	36	100	72	100	3	100	24	100
Inadequate	0	0	0	0	0	0	0	0
Total	36	100	72	100	12	100	24	100

From the data contained in Table 1.2, 100% (percent) of the headteachers, teachers, and pupils in primary schools indicated that schools play a crucial role. Besides, 100% (percent) of headteachers and students in secondary schools reported that schools play a pivotal role. Further findings from Table 1.2 indicated that none of the respondents said schools don't play a crucial role. Overall, therefore, there was a consensus that schools are essential. This implied that with the closure of schools, learning was not taking place.

The third objective sought to investigate online initiatives that can mitigate the impact of COVID-19.

- The study sought views from the headteachers and teachers on the availability of I.C.T. equipment. Their perceptions were captured in Table 1.3.

Table 3: Perceptions of Head teachers and Teachers on Availability of ICT Equipment

Adequacy	Primary schools				Secondary schools			
	Head teachers		Teachers		Head teachers		Teachers	
	n	%	n	%	n	%	n	%
Adequate	2	5.6	50	17.4	3	25	30	31.3
Inadequate	34	94.4	238	82.6	9	75	66	68.7
Total	36	100	72	100	12	100	24	100

From the data contained in Table 1.3, 5.6% (percent) of the headteachers and 17.4% (percent) of teachers in primary schools indicated that I.C.T. equipment was adequate. However, 25% (percent) of the headteachers and 31.3% (percent) of teachers in secondary schools reported that I.C.T. equipment was sufficient. Further findings from the data in Table 1.3 indicated that 94.4% (percent) of the headteachers and 82.6% (percent) of teachers in primary schools reported that I.C.T. equipment was inadequate. However, 75% (percent) of the headteachers and 68.7% (percent) of teachers in secondary schools indicated that I.C.T. equipment was insufficient. Overall, therefore, there was inadequate I.C.T. equipment. This implied that online classes are hardly conducted in basic institutions.

- The study also sought to establish the availability of I pads/ laptops to headteachers, teachers, and pupils.The headteachers' teachers' and pupils' responses were reflected in Table 1.4.

Table 4: Perceptions of Head teachers and Teachers on Availability of Ipads/ Laptops

Attendance	Primary schools							Secondary schools					
	head teachers		Teachers		Pupils			head teachers		Teachers		Pupils	
	n	%	n	%	n	%		n	%	n	%	n	%
Available	2	5.6	2	2.7	0	0		9	75	3	12.5	0	0
Not Available	34	94.4	70	97.3	180	100		3	25	21	87.5	60	100
Total	36	100	72	100	180	100		12	100	24	100	60	100

Concerning data in Table 1.4 on availability of Ipads/lab tops, 5.6% (percent) of headteachers in primary schools and 12.5% (percent) of headteachers in secondary schools indicated that they had Ipads/laptops. Besides, 2.7% (percent) of teachers in primary schools and 12.5% (percent) of teachers in secondary schools stated they had Ipads/lab tops. However, none of the pupils in both primary and secondary schools indicated they had Ipads/laptops. Further findings from Table 1.4 revealed that 94.4% (percent) of headteachers in primary schools and 25% (percent) of headteachers in secondary schools noted that they did not have Ipads/laptops. Also, 100% (percent) of teachers in primary schools and 87.5% (percent) of secondary schools indicated they lacked Ipads/laptops. One hundred percent of pupils in both primary and secondary schools lacked Ipads/ laptops. Overall, teachers and pupils in primary schools lacked Ipads/laptops. This implied that due accessibility to e-learning is constrained.

- Further, the study sought headteachers' and teachers' perceptions on whether they are computer literate. Their perceptions were captured in Table 1.5.

Table 5: Headteachers and Teachers' Perceptions on Computer Literacy

Attendance	Primary schools							Secondary schools					
	head teachers		Teachers		Pupils			head teachers		Teachers		Pupils	
	n	%	n	%	n	%		n	%	n	%	n	%
Literate	2	5.6	2	2.7	0	0		9	75	3	12.5	10	16.7
Illiterate	34	94.4	70	97.3	180	100		3	25	21	87.5	50	83.3
Total	36	100	72	100	180	100		12	100	24	100	60	100

Concerning data in Table 1.5, 5.6% (percent) of the headteachers in primary schools and 75% (percent) of headteachers in secondary schools indicated that they were literate. Besides, 2.7% (percent) of teachers in primary schools and 12.5% (percent) of teachers in secondary schools indicated that they were digitally literate. However, 0% (percent) of the pupils in primary schools and 16.7% (percent) of the pupils in secondary schools indicated that they were computer literate. Further findings Further, findings in Table1.5 revealed that 94.4% (percent) of the headteachers in primary schools and 25% (percent) of headteachers in secondary schools indicated that they were computer illiterate. Besides, 97.3% (percent) of teachers in primary schools and 87.5% (percent) of secondary schools indicated that they were digitally illiterate. However, 100% (percent) of the pupils in primary schools and 83.3% (percent) of the pupils in secondary schools indicated computer illiteracy. Overall, teachers and pupils stated that they were computer illiterate. This is an indication that digital competency is crucial in basic education institutions in Kenya.

- The study also sought headteachers' views on challenges facing e-learning. Their perceptions were captured in Table 1.6.

Table 6: Head teachers' Views on E-learning Challenges

Views	Rating			
	Primary		Secondary	
	n	%	n	%
Connectivity	27	75	8	66.7
Cost of band width	27	75	9	75
Infrastructure	27	75	4	33.3
Technical support	27	75	6	50

Concerning data in Table 1.6, 75% (percent) of headteachers in primary schools and 66.7% (percent) of headteachers in secondary schools connectivity was a challenge. In addition, 75% (percent) of headteachers in primary and secondary noted that the cost of bandwidth was a challenge. Further findings from Table 1.6 revealed that 75% (percent) of the headteachers in primary schools and 33.3% (percent) of headteachers revealed that infrastructure was a challenge. Also, 75% (percent) of the headteachers in primary schools and 50% (percent) of the headteachers in secondary schools indicated that technical support was challenging. Thus, overall, headteachers in primary and secondary schools perceived that connectivity, cost of the band with, infrastructure, and technical support were challenges in implementing e-learning. This was an implication that implementers of MOOCs should be cautious of these aspects when establishing e-learning in schools.

- The study also sought headteachers' consensus of MOOCs in mitigating the impact of COVID-19 on Education. Their perceptions were captured in Table 1.7.

Table 1: Perceptions of Head teachers on Mitigation of COVID-19.

Perceptions	Rating			
	Primary		Secondary	
	n	%	n	%
Strongly agreed	27	75	8	66.7
Agree	9	25	4	33.3

Disagreed	0	0	0	0
Strongly disagreed	0	0	0	0

About data in Table 1.7, that 75% (percent) of headteachers in primary schools and 66.7% (percent) of headteachers in secondary schools agreed that MOOCs are crucial for mitigating the impact of COVID-19 on Education. However, 25% (percent) of headteachers in primary schools and 33.3% (percent) of teachers in secondary schools strongly agreed that information technology is crucial for mitigating COVID-19 on Education. Further, the findings from Table 1.7 revealed that none of the headteachers in primary and secondary schools disagreed that MOOCs are essential for mitigating the impact of COVID-19 on Education. Also, none of the headteachers in both primary and secondary schools strongly disagreed that MOOCs are critical to the effect of COVID-19 on Education. Overall, headteachers in primary and secondary schools perceived that MOOCs are vital in mitigating the impact of COVID-19. This was an implication that MOOCs should be initiated in Kenyan basic institutions to combat the effects of COVID-19 on Education.

Testing the Hypothesis of the study

The study hypothesis was H.O.: Massive Open Online Courses do not significantly mitigate the impact of COVIT-19 on Education. Regression analysis was done to determine the mitigation of the COVID-19 on Education in primary and secondary schools. Results of the investigation were as indicated in Table 1.8.

Table 8: Regression Model on MOOCs

				Change statistic				
R	R Square	Adjusted R Square	Std Error of the Estimate	R Square Change	F Change	df1	df2	Sig F Change
.368	.135	-.345	.531	.135	.282	5	9	.912

- *Predictors:* (Constant); computing labs, I.T. teachers, computers, digital competencies, electricity, connectivity
- *Dependent:* e-learning

Concerning the data contained in Table 1.8, results were summarized by the following regression analysis equation:

$$Y= a+bX;$$

Where Y = dependent value (learning process) that was being predicted in this study. X was the independent value (teaching/learning approaches). The value (a) was the constant in the regression analysis equation. It was the intercept point of the regression line and the Y-axis. The (b) value was the coefficient of X. It was the slope of the regression line. The independent variable for the Hypothesis Ho in the study was Massive Open Online Courses and their influence on the mitigation of COVID-19 in primary and secondary schools.

The results in Table 1.8 indicated that the significance level was at sig F= 0.912. It was greater than p= 0.05. The relationship F (5,9) = 0.282. p>0.05, adjusted $R2$=34.5% (percent). The Hypothesis was, therefore, rejected. This meant that X= MOOCs predicted mitigation of the impact of COVID-19 in primary and secondary schools. The study, therefore, revealed that adoption of the Massive Open Online Courses (MOOCs) predicted the mitigation of the impact of COVID-19 in primary schools by 34.5 % (percent).

IX. MAJOR FINDINGS

The study's findings revealed that schooling is crucial for the development of both social and economic skills. Besides, the study showed that

the coronavirus has negatively impacted education. It was also stated that the available physical facilities and water resources could not mitigate the effects of the coronavirus. The study further established that schools lack essential equipment for Massive Open Online Courses (MOOCs). The findings further revealed that teachers lack digital competency. The study also indicated that connectivity issues were crucial in the implementation of MOOCs. Besides, the study pointed out that connectivity, cost of bandwidth, infrastructure, and technical support were challenges in implementing e-learning. It was further noted that of the four trends in education, online learning could mitigate the effects of the coronavirus. Finally, regression analysis revealed that MOOCs significantly reduce the impact of COVID-19 on education by 34.5 percent.

X. CONCLUSIONS

The study concluded that schools are crucial for social and economic development. It was also concluded that the coronavirus has negatively impacted on education as learning has been interrupted globally. It was further concluded that I.C.T. equipment in basic institutions is inadequate. Besides, it was concluded that teachers lack the necessary competencies to implement e-learning.In addition, it was concluded that connectivity, bandwidth costs, infrastructure, and technical support were challenges in implementing e-learning. Finally, it was concluded that Massive Open Online Courses (MOOCs) could mitigate the impact of COVID-19 on education.

XI. RECOMMENDATIONS

It was recommended that proper structures be put in place to combat COVID-19. Besides, it was suggested that education stakeholders should facilitate schools' acquisition of essential equipment for I.C.T. It was also recommended that in-service education and training (INESETS) be organized for teachers to equip them with digital competencies. It was further suggested that Massive Open Online Courses (MOOCs) be initiated in basic education institutions.

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Validation of the Concept of Structural Semantics in the Field of Translation Studies

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ABSTRACT

This paper aims to illustrate and validate the concept of structural semantics in translation studies. Indeed, in linguistic description, semantics is not autonomous. It is an outcome of the combination of lexical items in a particular manner. It hinges on syntax. Therefore, syntax and semantics are inseparable, especially in a contrastive linguistic perspective. The methodolgy is both theoretical and analytical. Authors like Chomsky, Halliday, Nida, etc., are cited to support the arguments brought forward. As a result, syntax influences semantics in many ways. The function of each lexical item in a sentence influences the meaning of the sentence. The meaning of a particular word can change depending on its syntactic environment. Poor sentence structuring in translation entails conflicting statements compared to the source language text. An analysis of surface structure and deep structure in a source language enables translators to properly restructure sentences in a target language to produce a meaning that is similar to the source language meaning.

Keywords: structural semantics, translation studies, syntax, source language, target language.

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RÉSUMÉ

L'objectif du présent article est d'illustrer et de valider le concept de sémantique structurale en traductologie. En effet, dans la description linguistique, la sémantique n'est pas autonome. Elle est le résultat de la combinaison d'éléments lexicaux d'une manière particulière. Elle dépend de la syntaxe. Par conséquent, la syntaxe et la sémantique sont inséparables, en particulier dans une perspective de linguistique contrastive. La méthodologie est à la fois théorique et analytique. Les auteurs tels que Chomsky, Halliday, Nida, etc., sont cités pour appuyer les arguments développés. En conséquence, la syntaxe influence la sémantique de plusieurs façons. La fonction de chaque item lexical dans une phrase influence le sens de la phrase. Le sens d'un mot particulier peut changer en fonction de son environnement syntaxique. Une mauvaise structuration des phrases en traduction implique des déclarations contradictoires par rapport au texte de la langue source. Une analyse de la surface structure et de la deep structure dans une langue source permet aux traducteurs de restructurer correctement les phrases dans une langue cible pour produire un sens similaire à celui de la langue source.

Mots-clés : *sémantique structurale*, traductologie, syntaxe, langue source, langue cible

I. INTRODUCTION

I begin this discussion of the concept of Structural Semantics in Translation Studies by quoting Saussure who states that: « *La grammaire étudie la langue en tant que système de moyens d'expression ; qui dit grammatical dit synchronique et significatif…* » (2005, p. 144). This means that any grammatical statement is supposed to be synchronic and meaningful.

This statement is an important point in this paper which attempts to analyse the points of connection between syntax and semantics in a contrastive linguistics perspective. However, the contrastive perspective will be dealt with after a

few more remarks on syntax and semantics in English linguistics.

Indeed, in *Syntax and Semantics Lexical Functional Grammar*, Dalrymple M. (2001) evokes the concept of compositionality which notes that there is a close relation between the rules of syntax and the rules of semantics.

An adequate treatment of linguistic meaning requires, then, a theory of the meanings of the most basic units of a sentence, together with a theory of how these meanings are put together. A commonly accepted version of the Principle of Compositionality is the rule-to-rule hypothesis, which states that "a very close relation is supposed to exist between the rules of the syntax and the rules of the semantics" (Bach 1989). This means that each syntactic rule for combining syntactic units to form a larger syntactic unit corresponds to a semantic rule that tells how to put the meanings of those units together to form the meaning of the larger unit. (2001, pp. 217-218).

The issue raised in this quotation is interesting because it not only underlines the relation between syntax and semantics but it also calls for the need to come up with a theory of meaning bringing together syntactic rules and semantic rules.

To start this discussion in the perspective of contrastive linguistics, there is a need to mention the ideas developed by Nida in *The Theory and Practise of Translation* (1982) and in *Towards a science of translation* (1964). Actually, Nida's theory of structure is based on several key concepts including Surface Structure, Deep Structure, Transforms, Kernels, Restructuring, Formal Correspondence, Dynamic Equivalence. Some of the main ideas developed by this American Bible translator suggest that to produce meaning in a target language, the translator needs to restructure the sentence. In other words, the structure of a source language text should not be transferred unchanged to the target language because there is a risk of confusion and of inappropriate combination of words.

In the light of the points made so far, this paper reviews some of the theories relating to the interface between syntax and semantics. Furthermore, it analyses some translated sentences and shows the lack of formal correspondence between the English version and the French version.

At this stage, it is useful to indicate that in Nida's and Catford's theories, formal correspondence means correspondence of forms or structure. In living English structure, there are five ranks, namely sentence, clause, group/phrase, word and morphemes. There is formal correspondence between a translation and a source language text when a clause is translated by a clause; a phrase is translated by a phrase; a word is translated by a word, and so on. At times, a clause can be translated by a group, which is a lower rank. A group can also be translated by a word. In this case, Catford says that there is a rank shift.

Finally, the paper draws important conclusions to justify the idea that syntax is both a meaning carrier and a meaning trigger in a contrastive linguistic perspective.

II. METHODOLOGY AND THEORETICAL BACKGROUND

Two approaches are used to conduct this research, namely the theoretical approach and the analytical approach.

1.1 Theoretical Approach and Theoretical Background

This approach reviews some of the theories of prominent authors who have discussed the interface between syntax and semantics.

1.1.1 What is syntax?

Halliday has given the following definition:

"There is another reason for using the term 'syntax'. This word suggests proceeding in a particular direction, such that a language is interpreted as a system of forms, to which meanings are then attached. In the history of western linguistics, from its beginning in ancient Greece, this was the direction that was taken: first

the forms of words were studied (morphology); then in order to explain the forms of words, grammarians explored the forms of sentences (syntax); and once the forms had been established, the question was then posed: "what do these forms mean?" In a functional grammar, on the other hand, the direction is reversed. A language is interpreted as a system of meanings, accompanied by forms through which the meanings can be realized. The question is rather: "How are these meanings expressed?" (1985, p.).

This definition seems to be insufficient because syntax is simply defined as "the forms of sentences". Nothing is said about the grammatical functions of words in sentences. In another definition of syntax, Saussure insists on the grammatical function of words.

La morphologie traite des diverses catégories de mots (verbes, noms, adjectifs, pronoms, etc.) et des différentes formes de la flexion (conjugaison, déclinaison). Pour séparer cette étude de la syntaxe, on allègue que cette dernière, a pour objet les fonctions attachées aux unités linguistiques tandis que la morphologie n'envisage que leur forme. [...] La syntaxe renseigne sur l'emploi de ces deux formes. (Saussure, 2005, p. 144).

In this quotation, Saussure explains that the object of syntax is to study the functions of linguistic units whereas morpholgy only studies their form. As a consequence, syntax not only deals with the combination of words in a sentence but it also analyses their functions.

1.1.2 The notion of syntagm

Another salient point in the description of syntax by Saussure is the way he has explained the notion of syntagm:

[...] La notion de syntagme s'applique non seulement aux mots, mais aux groupes de mots, aux unités complexes de toute dimension et de toute espèce (mots composés, dérivés, membres de phrase, phrases entières). Il ne suffit pas de considérer le rapport qui unit les diverses parties d'un syntagme entre elles (par exemple contre et tous dans contre tous, contre et maître dans contremaître) ; il faut tenir compte aussi de celui qui relie le tout à ses parties (par exemple contre tous opposé d'une part à contre, de l'autre à tous, ou contremaître opposé à contre et à maître). (op. cit. 133).

A syntagm is made up of words as well as of groups of words, complex units including compound words, portions of sentences, whole sentences, etc. It is not enough to take into consideration the link between the various parts of a syntagm; it is equally important to take into account the link between the whole syntagm and its various parts.

A syntagm suggests the idea of an orderly succession of definite elements or items. Of paramount importance is the idea of order. That is what Saussure suggests in the following statement:

Tandis qu'un syntagme appelle tout de suite l'idée d'un ordre de succession et d'un nombre déterminé d'éléments, les termes d'une famille associative ne se présentent ni en nombre défini, ni dans un ordre déterminé. (Ibid, p. 135).

To sum up, the structuralist view of syntagm encompasses the grammatical functions of words, groups of words, etc., in a sentence as well as their orderly arragement. In addition, the relations between the various parts of a syntagm and the relation between a whole syntagm and its various parts are equally important.

1.1.3 The notion of genitive in Latin

In an effort to illustrate the point made by Saussure on the importance of the functions of words in a syntagm, an example is given hereafter. In the following syntagm, the knowledge of the function of each word is important to understand the meaning of the syntagm: « *La critique de Skinner de Chomsky* » which can be translated either as "Chomsky's criticism of Skinner" or "Skinner's criticism of Chomsky".

In the first translation, i.e. *"Chomsky's criticism of Skinner"*, Skinner is the object, while Chomsky is the agent/subject; in the second translation, "Skinner's criticism of Chomsky", Skinner is the agent/subject, while Chomsky is the object.

In the languages like Latin (in which there are genitives), the knowledge of the genitive is important to tell 'who does what' in a sentence. For example, *Petri* is the genetive in the syntagm *liber Petri*. In explaining this point, Dubois et al. (1994, p. 217) indicate that Dans "*Le livre de Pierre*, Pierre est au génitif dans les langues casuelles (en latin *liber Petri)*

1.1.4 The points of connection between syntax and semantics

In describing the points of connection between syntax and semantics, Chomsky (2000, p. 93) states that:

In proposing that syntactic structure can provide a certain insight into problems of meaning and understanding we have entered onto dangerous ground. There is no aspect of linguistic study more subject to confusion and more in need of clear and careful formulation than that which deals with the points of connection between sytax and semantics.

In Syntactic Structures (2000), Chomsky has discussed this issue at length by giving arguments refuting and supporting claims of connection between syntax and semantics. He has presented a list of six assertions supporting the dependence of grammar on meaning and has subsequently provided counterexamples. The assertions include the following: (117) (i) Two utterances are phonemically distinct if and only if they differ in meaning; (ii) morphemes are the smallest elements that have meaning; (iii) grammatical sentences are those that have semantic significance.

Particularly striking in this list is the constant reference to syntactic elements and their relation with semantic features which are perceived as their defining characteristics. However, in a subsequent section, Chomsky has given counterexamples to restrict the validity of these assertions.

Thus we have counterexamples to the suggestion (117ii) that morphemes be defined as minimal meaning bearing elements. In Ɛ2 we have given grounds for rejecting "semantic significance" as a general criterion for grammaticalness, as proposed in (117iii). (Ibid, p. 100).

In another section, Chomsky rightly says that to understand a sentence, it is necessary to know more than the analysis of this sentence on each linguistic level. The knowledge of the reference and meaning of the morphemes and words used in the sentence is equally important.

1.1.5 The syntactic framework's influence on word meaning

Chomsky notes that in describing the meaning of a word, it is quite useful to take into acount the syntactic framework in which it is used. For example, in describing the meaning of "hit", the description of the agent and object of the action in terms of the notions 'subject' and 'object' would be useful. This remark is critically important in the perspective of contrastive linguistics.

A similar remark has been made by Gross (2010) in a paper titled *« Sur la notion de contexte »* published in *Meta*. However, it is important to indicate that the paper by Gross has listed some synonyms of the verb *casser* depending on the context in which it is found. Therefore, he has not made this point in the perspective of contrastive linguistics. This quotation by Gross provides the synonyms of the verb *casser*:

On verrait ainsi que casser signifie briser avec des compléments comme verre, vaisselle ; fracturer avec un complément désignant un membre comme jambe ou bras; et annuler si l'objet fait partie de la classe des contrats ou des actes juridiques… : c'est le contexte qui détermine le sens d'un terme (Gross 1994a)… Il est donc acquis que pour comprendre le sens d'un mot, il faut prendre en considération son environnement. Gross (2010, p. 188).

The main conclusion reached by Gross is that in order to understand the meaning of a word, it is necessary to take into account its environment (including its complement). Furthermore, this conclusion has the following theoretical consequences:

Conséquences théoriques - Les constatations que l'on peut faire à partir de cet exercice sont les suivantes: – Le lexique ne peut pas être séparé de la syntaxe, c'est-à-dire de la combinatoire des mots (Gross 1975); – La sémantique n'est pas autonome non plus: elle est le résultat de la combinaison des éléments lexicaux organisés d'une certaine façon (distribution, Gross 1981); – On ne peut postuler sérieusement qu'il existe trois niveaux indépendants dans la description linguistique, celui du lexique, de la syntaxe et de la sémantique, car on ne voit pas comment ils pourraient être articulés, s'ils étaient indépendants. (Ibid).

The point made by Gross in the quotation above is that words cannot be separated from syntax. Semantics is not autonomous either. It is an outcome of the combination of lexical items in a particular manner. It is not possible to seriously argue that there are three independent levels in linguistic description, namely the lexical level, the syntactic level and the semantic level. This is understandably so because any form of articulation of these three levels would be difficult if they were independent.

At this stage, there is a need to note that while Chomsky and Gross describe the points of connection between syntax and semantics in the context of English and/or French linguistics, this paper aims to discuss this issue in the perspective of contrastive linguistics.

In this perspective, the paper aims to prove that the concept of *structural semantics* is valid in the field of translation studies.

In connection with this, in a paper titled An Assessment of the Influence of Syntagm and Context on Lexical Semantics in Translation Studies, Akpaca (2016, p. 57) says that:

The aim of this paper is to show that words only have meaning in context…However, to contribute meaning words need to be used in sentences where they contract syntagmatic relations with other words. Further, the context in which a word is used can change its meaning. Different contexts can activate different word meanings. The verb 'Consider', for example, has taken ten different meanings in the examples provided below. As a result, word meaning is in the field.

The ten different meanings taken by the verb 'Consider' have been revealed by Chevalier et al. in a scientific publication on the TAUM/AVIATION system of machine aided translation. The TAUM/AVIATION translates information on the maintenance of an aircraft manufactured in Canada. This system follows the instructions given by a translation analyst. *Some e*xamples of instructions given by the *translation analyst* are given below.

- Si l'objet indirect de Consider est une proposition gérondive introduite par As, traduire Consider par « Supposer que » et transformer l'objet direct de Consider (Damage) en sujet de la gérondive (Extend).

Translation of this instruction into English: If the indirect object of the verb Consider is a gerund introduced by as, translate Consider by « suppose that » and turn the direct object of Consider (Damage) into subject of the gerund (Extend).

Below is the machine assisted translation of the instruction:

(6A) Consider The Damage As Extending To The Wing Tip.

(6F) Supposer que les dommages s'étendent jusqu'au saumon d'aile.

- *Si l'objet indirect est un groupe nominal, il peut être introduit par As ou For :*

(a) Si le groupe nominal est introduit par As, traduire Consider par « Considérer » :

Translation of this second instruction into English: If the indirect object is a nominal group, it can be translated by As of For.

Below is the machine assisted translation of the instruction:

(7A) Accuracy Is Considered As The Most Important Criterion.

(7F) La précision est considérée comme le critère le plus important.

The examples given in the scientific publication illustrate the direct relation between syntax and semantics in translation. Indeed, the position and/or the grammatical function of a word or a group of words changes the meaning of the verb *Consider* in ten sentences translated into French. The conclusion of this section is that word meaning is dictated by context and syntax. Therefore, syntax is both a meaning carrier and a meaning trigger in translation.

1.1.6 The use of algorithm in selecting word meaning

The instructions given by the translator specialist are called algorithms by J.C. Catford. In *A Linguistic Theory of Translation,* Catford (1965, p. 31) explains that:

For the purpose of machine translation, translation rules may be operational instructions for co-textual search for items marked in the machine glossary by particular diacritics, with instructions to print out the particular conditioned equivalent in each case. Such operational instructions, which if followed, can be guaranteed with a high degree of probability to produce a 'correct' result, are known as algorithms.

Catford says that the looser instructions for human translators are called *translation rules*.

The principle of algorithm described by Catford and the algorithms used by the Canadian researchers mentioned above share some similarities. Catford calls it conditioned or unconditioned equivalence probability. The probability is conditioned when the translation analyst gives instructions to a machine to translate a particular word in a particular manner in a particular context or syntagm.

Taking into account the information provided above on algorithm and translation equivalence, it is obvious yet again that the meaning of a word can be infered or deducted on the basis of the syntagmatic framework in which the word is found.

1.1.7 Nida's views on syntax and semantics

Another prominent translation theorist who has written extensively on syntax problems in translation is Eugene Nida. Indeed, in *Theory and Practice of Translation* (1969), Nida gives the following examples to show how a poor handling of syntax can make a message confusing and unclear in the target language.

In addition to being quite misleading, a translation may also be so stylistically heavy as to make comprehension almost impossible. For example, in the American Standard Version (1901), 2 Corinthians 3 :10 reads, "For verily that which hath been made glorious hath not been made glorious in this respect, by reason of the glory that surpasseth." The words are all English but the sentence structure is essentially Greek. The New English Bible quite rightly restructures this passage to read, "Indeed, the splendour that once was is now no splendour at all; it is outshone by a splendour greater still." (Nida & Taber, 1969, p. 2).

The problem with the rendering of this biblical verse from Greek into English is that the sentence structure is Greek while the words are English. This is a main problem in translation. When the translator is not experienced enough to restructure the message in the target language, s/he conveys a message which is incomprehensible.

Nida has given other examples that are quoted below. Rom. 3 :21-22.

But now the righteousness of God without the law is manifested,	But, in these days, God's way of justification has at last been brought to light; one which was	But now God's way of putting men right with himself has been revealed, and it has nothing

being witnessed by the law and the prophets; even the righteousness of God which is by faith of Jesus Christ unto all and upon all them that believe. (KJV)	attested by the law and the prophets, but stands apart from the law; God's way of justification through faith in Jesus Christ, meant for everybody and sent down upon everybody without distinction, if he has faith. (Knox)	to do with law. The Law and the prophets gave their witness to it: God puts men right through their faith in Jesus Christ. God does this to all who believe in Christ. (TEV)

The reader of the three different translations of these verses is struck by the way the message is rendered, especially in the first two versions, i.e. KJV and Knox. The KJV translation is hardly comprehensible. There is only one sentence in it compared to three sentences in the TEV translation which is very clear. When you read these three versions of the Holy Scriptures, if you are an experienced translator, you quickly notice that the lack of clarity of the message, especially in the KJV version, is due to poor handling of syntax in the English language. The KJV translator has transfered the Greek syntax into English. It is a total failure. However, unlike the KJV translator, the TEV translator has restructured the message in English to make it clear.

In the light of the syntactic problems revealed by Nida, it becomes obvious that when a translator does not know how to deal with problems of syntax, s/he constructs misleading and strange sentences. Consequently, it is critically important for the translator to restructure the sentence in the target language. Below is a diagram in which Nida shows how syntax should be restructured in the target language.

The second system of translation consists of a more elaborate procedure comprising three stages: (1) analysis, in which the surface structure (i.e., the message as given in language A) is analyzed in terms of (a) the grammatical relationships and (b) the meanings of the words and combinations of words, (2) transfer, in which the analyzed material is transferred in the mind of the translator from language A to language B, and (3) restructuring, in which the transferred material is restructured in order to make the final message fully acceptable in the receptor language. (Nida, 1982, p.33).

This approach may be diagrammed as in Figure 6.

A (Source)B (Receptor)

I ↑

Analysis Restructuring

↓ I

X----------Transfer----------→Y.

In order to solve syntax problems and make translation clear, Nida has come up with the concepts of *Formal Correspondence* and *Dynamic Equivalence*. The TEV version above is an example of Dynamic Equivalence.

1.1.8 The Analytical Approach

In the analytical approach, some concrete examples are extracted from a research work carried out by a scholar.

In discussing issues relating to syntax and semantics in her Master's thesis titled « *Evaluation de la sémantique lexicale, des transformations syntaxiques, des procédés de traduction et de la logique modale dans la traduction d'un manuel intitulé "Selecting Leading Social Entrepreneurs* », Biao (2018) gives the following examples of surface structure, deep structure and restructuring:

"La syntaxe ayant trait à la structure de la phrase, au cours de notre travail, nous n'avons pas pu nous empêcher d'opérer des restructurations syntaxiques afin d'exprimer les

idées naturellement en français. Les exemples suivants montrent clairement ces transformations." (p.72)

1st example:

To do so requires one to resort to instinct and gut feelings, not just rational analysis. (p.72)	Pour ce faire, il faut recourir à l'instinct et à l'intuition, pas seulement à l'analyse rationnelle. (p.72)

Biao explains that in translating the sentence above into French, she has restructured it. In the English version, 'to do so' is the subject of 'requires', whereas in the French version, the syntax is different. Given that the phrase 'to do so' is inanimate, in French it is not appropriate to use an inanimate subject for an action verb. That is why she has restructured the translated sentence which reads as follows: « pour ce faire, il faut recourir… ». The point is that while 'to do so' is an actor in the English sentence, its equivalent '*pour ce faire*' is not. The French translation has restructured the sentence in a way that turns the subject of the verb into a mere prepositional phrase.

The issue of syntactic transformation has been discussed by Nida who was inspired by Chomsky's works on Generative Grammar. Nida has said that:

The deep structure is understood as the underlying feature of communication that contains all the semantic meaning in a given text. It is subject to transformational rules that are applied by a translator in order for it to be transferred across languages and when the transfer is complete, a set of phonological and morphemic rules are then applied in order to generate a surface structure (Nida 1964:57-69).

Nida has given further explanations on the process through which a translator decodes and encodes a message and then reconstructs sentences in the target language.

The source text is analysed at the surface level so that the deep structure can be identified before being transferred and restructured semantically and stylistically in an appropriate source language surface structure. The first important factor is that the procedure must produce "a translation in which the message of the original text has been transported into the receptor language in such a way that the RESPONSE of the RECEPTOR is essentially that of the original readers" (Nida and Taber 1969:200).

In the following sentence, the English structure is different from the French one.

2nd example:

The Ashoka community's ability to help its members succeed and also to entrepreneur together major pattern changes en route to an "Everyone a Change maker™" future depends on its continuing to select only the new ideas and entrepreneurs that together will change the world. (p. 50)	La capacité de la communauté Ashoka à aider ses membres à réussir et à opérer ensemble des changements majeurs en vue d'un avenir où tout le monde sera un acteur du changement dépend du fait qu'elle continue à sélectionner uniquement les nouvelles idées et les entrepreneurs qui changeront ensemble le monde. (p50)

Biao indicates that the phrase *"en route to an everyone a changemaker future"* is translated as follows: « en vue d'un avenir où tout le monde sera un acteur du changement ». In the translation of this phrase, the place of the equivalent of the word 'future' (i.e. *avenir*) has changed. Furthermore, there is no equivalent of the lexical item 'où' in the English sentence. There is a verb (i.e. *sera*) in the French syntagm, unlike the English syntagm.

It is obvious that the syntactic features of the two sentences are not similar. As a result, there is no formal correspondence between these two sentences. Indeed, the phrase:

"En route to a everyone a Changemaker future" has the following structure: Prepositional phrase + noun phrase + noun phrase

While the French phrase has the following structure:

« en vue d'un avenir où tout le monde sera un acteur du changement » : prepositional phrase + noun phrase + adverb phrase + noun phrase + verb phrase + noun phrase

3rd example:

Version anglaise	Traduction française
Of Ashoka's five criteria, this has the most narrowly filtering mesh. (p. 61)	Parmi les cinq critères d'Ashoka, celui-ci est le critère le plus exigeant qui permet de tamiser. (p. 61)

The structure of the English sentence is as follows: Prepositional phrase + verb phrase + adverb phrase

The structure of the French sentence is as follows: Prepositional phrase + noun phrase + verb phrase + noun phrase + verb phrase

II. RESULTS

The following results spring from the theories and analyses of the points of connection between syntax and semantics.

- Syntax is not just the combination of words in a sentence or in a text. It deals with the functions of the words as well. The orderly succession of words in a sentence is equally important in the definition of syntax.
- While some authors like Chomsky have some reservations about the points of connection between syntax and semantics, others like Nida, Catford and Gross make it clear that syntax and semantics are inseparable and that syntax is a meaning carrier, especially in a contrastive linguistic perspective.
- The syntactic framework in which a word is used influences its meaning.
- Algorithms are used in machines to deduct word meaning taking into account the context and the syntactic environment.
- A Source Language (SL) text needs to be restructured in the Target Language to produce meaningful sentences.
- There is rarely formal correspondence between a SL text and a TL text.

III. DISCUSSION

3.1 Syntax as a vehicle

There is no denying that syntax plays a major role in semantics. One is tempted to say that it is a vehicle that carries meaning from a source language to a target language. To stick to this metaphor, it is important to stress that drivers (i.e. translators) need to learn how to drive this vehicle effectively.

As a matter of fact, foreign language students know a lot of foreign words but they do not know how to put them together to construct meaningful sentences and to express their ideas accurately. Some English teachers, for example, spend a lot of time teaching vocabulary out of any context instead of teaching students how to use words in sentences and in specific contexts. At the end of the day, foreign language teachers spend a lot of time correcting syntactic errors.

Translation students also write sentences that are meaningless in the target language. Then, when you ask them whether the sentences they have written make any sense to them, they say 'no'. The next question you ask them is: 'why do you keep these sentences in your translation while you know that they don not make any sense'? They tend to reply that it is because of the translation. If they were to write naturally in their official working language, they would not write meaningless sentences.

It emerges from the situation described above that students are 'tied' by syntax because they do not know how to 'distance themselves from it' and to restructure the text in the target language. In foreign languages schools as well as in the schools of translators, a special emphasis should be laid on the teaching of syntactic rules and on the process of restructuring.

This issue highlights another aspect of translation studies, which is related to translation procedures. On this score, Catford explains in *A Linguistic Theory of Translation* (1965) that there are three types of translation, namely word-for-word translation, literal translation and free translation. Free translation is a type of translation which

makes it possible for the translator to recreate a totally new style and structure in the target language.

3.2 Syntax as a path

Translation can also be compared to a path. Indeed, when a path is well designed and constructed, it makes the flow of traffick easier and smoother. The same applies to syntax. When it is well constructed, it makes the flow of ideas easier and smoother. Readers enjoy reading texts whose syntactic elements are in order.

To stick to the metaphor of path, imagine that you are driving from France to England. As soon as you cross the border, you must stop keeping right. In England, drivers keep left. If you continue keeping right, you will cause accidents. The same applies to syntax. In the process of tranferring ideas from French to English, you must make sure that you switch code (i.e. you decode and encode). In the words of Nida, you *analyse, transfer and restructure*.

3.3 Syntax is not just a combination of words in a sentence

As Saussure has rightly put it, syntax implies not only an orderly succession of words in a sentence but it also includes the functions of the words. As indicated above, in the languages using the genitive, you need to know the function of every word in a sentence to interprete or translate it properly. Regarding this issue, Nida's notion of semantic categories should be taken into account. Indeed, the semantic categories are events (represented by verbs), objects (represented by persons or nouns in a sentence), relationals (i.e. adjectives and adverbs) and prepositions. Nida suggests that all events and processes should be expressed by verbs in a translation into English; all qualities should be expressed by adjectives or adverbs in a sentence, etc. This procedure changes the syntax in the target language (which is in this case English). All Nida's semantic categories happen to be syntactic elements.

Concerning the points of connection between syntax and semantics, Gross has given convincing examples. It is difficult to separate words, syntax and semantics. These notions operate together to produce meaning. They contribute meaning individually and jointly.

Another significant finding is the notion of syntactic framework and its influence on word meaning. In discussing this linguistic aspect, some authors like Sue Atkin conclude that words do not have meaning. Rather, they have meaning potientials which are activated in various contexts. This approach to word meaning emancipates lexical items. Indeed, word meaning becomes a dynamic notion. It is only in a particular context that you can tell the meaning of a word.

Last but not least, formal correspondence between a SL text and a TL text is rarely achieved in translation. It is not the purpose of translation anyway. English and French have the same number of ranks (i.e. five ranks as mentioned earlier), however there are languages that have fewer or more number of ranks.

IV. CONCLUSION

This paper has demonstrated by means of theoretical and practical examples that the concept of structural semantics should be validated in translation studies. Indeed, phrase structure and/or sentence structure plays a significant role in translation. Translators' competence is revealed not only through their word power and their ability to apply translation strategies but it is also revealed through their ability to restructure the source language text in the target language.

As shown in the examples above, syntax has caused many translators to go astray. Consequently, it is not enough to understand a message in a source language to translate it effectively. It is not enough to know the equivalents of all the source language words to do competent translation. The ability to restructure the message and to create an original structure in the target language is essential to convey meaning. This is the domain of structural semantics. The ability to interprete word meaning in a novel syntactic framework is also the domain of structural semantics. The ability to bring out a

new word meaning through syntagmatic solidarities is the domain of structural semantics.

It is out hope that the ideas and examples given in this paper to validate the concept of structural semantics will make an impact and emancipate the concept in translation studies.

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Knowledge Management, PAR, Sufficiency Economy Philosophy, and Growing Phak Wan Pah for Self-reliance in Thailand

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ABSTRACT

This research project was to study the results of applying Knowledge Management (KM), through applying participatory action research, sufficiency economy philosophy, growing phak wan pah vegetable for the development of knowledge managers at self-reliance learning centers in Thailand. The development model comprised 19 sub-courses which focused on practical skill development. Participants were 15 knowledge managers from 2 self-reliant centers in Maha Sarakham, and Khon Kaen province. The skill and knowledge development course lasted 4 days and 3 nights and then the participants applied the gained knowledge at self-reliance centers for the subsequent 4-6 months. Overall, the development course yielded success with the efficiency of knowledge output of 88.94 / 83.22. The effectiveness index was 0.7178 which explained the resource leader's higher knowledge 71.78%. Participants of the project who have a farm area of approximately 1-3 rais had a substantial debt reduction and were able to generate income from harvesting phak wan pah for 6-8 months per year. The farmers are able to get 150-200 Baht per kilogram of phak wan pah and have an earning potential of over 100,000 baht per year.

Keywords: knowledge management, participatory action research, sufficiency economy philosophy, self - reliance, phak wan pah.

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ABSTRACT

This research was to study the results of applying Knowledge Management (KM), through applying participatory action research, sufficiency economy philosophy, growing phak wan pah vegetable for the development of knowledge managers at self-reliance learning centers in Thailand. The development model comprised 19 sub-courses which focused on practical skill development. Participants were 15 knowledge managers from 2 self-reliant centers in Maha Sarakham, and Khon Kaen province. The skill and knowledge development course lasted 4 days and 3 nights and then the participants applied the gained knowledge at self-reliance centers for the subsequent 4-6 months. Overall, the development course yielded success with the efficiency of knowledge output of 88.94 / 83.22. The effectiveness index was 0.7178 which explained the resource leader's higher knowledge 71.78%. Participants of the project who have a farm area of approximately 1-3 rais had a substantial debt reduction and were able to generate income from harvesting phak wan pah for 6-8 months per year. The farmers are able to get 150-200 Baht per kilogram of phak wan pah and have an earning potential of over 100,000 baht per year. The participants entered the project as volunteers but became knowledge managers in self-reliance through PAR, and have a sustainable development future in accordance with the philosophy of the sufficiency economy.

Keywords: knowledge management, participatory action research, sufficiency economy philosophy, self-reliance, phak wan pah.

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I. INTRODUCTION

Many knowledge intensive organizations utilize knowledge management (KM) to better manage their knowledge assets (Jennex, 2013). Educational organizations, agricultural development, vocational groups apply KM in the development of the groups knowledge education program. KM is an action discipline where knowledge is used and applied for to have an impact (Jennex, 2007). Even emergency response groups in crisis management have proposed and created KM enhanced Emergency Response systems that allow for more efficient use of data and faster response (Jennex & Murali, 2009). Successful KM should lead to the strengthening of organizational and learning cultures (Jennex, Smolnik & David, 2012). KM in projects will benefit and assist projects in utilizing knowledge. But maximum benefit can only be attained if the organization has a KM process (Jennex, Lorne & Theophilus, 2003). KM helps organizations leverage knowledge and helps to improve the application of knowledge sources by users (Jennex, 2007). Knowledge Management or KM is a systematic process for acquiring knowledge, creating knowledge, and storing knowledge (Igbinovia & Ikenwe, 2018). KM is a subject related to human resources with an emphasis on the organizational culture and the formation of team works (Poynder, 1998). The central element of KM is the development of the "knowledge

worker", including leadership, autonomy, performance measurement and rewards, organizational structure and organizational culture (Lee and Kim, 2001). The collaborative actions in an organization can be applied for job development, human development, and organization development (Panich 2007: 6). KM is one of the most quickly developing concepts of management (Lendzion, 2015). Knowledge Management (KM) in agriculture is a core aspect of agricultural productivity and profitability (Cheruiyot, Sang & Ngetich, 2020). The main obstacles of KM application in agricultural context are: limited time and lack of qualified staff (Zecca & Rastorgueva, 2017). After the Thailand 1997 economic crisis, a new theory of agriculture was introduced (Khaokhrueamuang, 2014) and was utilized as a practical guideline and philosophy called "sufficiency economy". Farmers applied sufficiency economy philosophy at different levels with different understandings. This caused anxiety and many farmers searched for true knowledge managers who could teach them on sufficiency economy philosophy, self-reliance, and KM. Manolai (2014: 2-4), a farmer at Ban Phon Had Dong Khrang Noi District, in Roi Et Province detailed his experiences as a rice farmer who formerly relied on chemical fertilizers. The more rice he grew and harvested, the greater his debt would be as he spent more money on chemical fertilizer. Switching to organic fertilizer and sufficiency agriculture provided his family with sustainable profits. Sufficiency economy philosophy can be integrated with the transformation of agricultural products to create added value, increase profits and promote sustainable agriculture (U-tantada, Mujtaba, Yolles & Shoosanuk, 2016). Joint ventures can be strengthened by applying the philosophy of the sufficiency economy to production and to investment that uses the potential of the community. The philosophy supports the use of available raw materials in the community and indigenous knowledge that is applicable to current production technology.

A sufficiency economy (SE) approach offers a better alternative for smallholder agricultural development than uncritical acceptance of global materialism as SE focuses on people's life quality and well-being A sufficiency economy approach offers a better alternative for smallholder agricultural development and focuses on people's life quality and well-being (Chantalakhana & Falvey, 2008). Sufficiency economy philosophy can be applied to area-based levels to help the rural poor and also business operations which supports balance among economy, society and environment and enable the organizations to build a strong foundation for sustainable business (Siriphanupong & Rungkasiri, 2017). The researchers and the faculty of Education, Northeastern University proposed a community development project in collaboration with Mr. Sawang Manolai's Sufficiency Economy Learning Center at the Phonhad Learning Center, Khrang Noi sub-district, Kaset Wisai District, Roi Et Province, and Mr. Suthat Upolthianthien, owner of the sufficiency economy learning center at Kwa Bueng Kui, Lao sub-district, Kosum Phisai District Maha Sarakham Province. The purpose of the joint development project is to develop the potential of farmers, teachers, and parents of students to become knowledge managers in self-reliance and sufficiency economy by growing phak wan pah vegetable (sweet forest vegetable leaf) which is a highly profitable cash crop. Phak waan pah is special and has the potential of becoming a primary cash crop second only to rice cultivation. The phak wan pah vegetable plant can last for 100 years if properly taken care of. The current market price is up to 200 baht per kilogram and is a very lucrative alternative income for agriculture households in northeast Thailand.

II. BACKGROUND

Jennex, Olfman (2005) defines KM as the practice of selectively applying previous experiences of decision making to current and future decisions to current activities with the express purpose of improving the organization's effectiveness. Also, Chantarasombat, Sri sra-ard, Kuofie & Jennex (2010), KM is seen as a way of

changing the traditional knowledge transfer process to something that assists those who remain in the village. The KM approach investigated consisted of five stages: 1) Preparation 2) Create motivation, promote participation 3) Develop the KM plan 4) Implement the KM plan, and 5) Evaluation. Another key definition of KM Jennex (2013) knowledge management success and dimensions and measures the organizations can use to value knowledge management success, an unclear unitarily engineering organization is used to illustrate how these dimensions and measures can be used to demonstrate the success of knowledge management initiative/project. Managing the life cycle of knowledge Global organization Ramazanzade, Aati, Shokohifard & Farshid (2019) pedagogical knowledge management is the management of knowledge and experiences in teaching, assessment, learning theories, classroom management, and other areas of education. An analytical study of the literature can be helpful in understanding the pedagogical knowledge management approach. Thus, this study aims to perform a synthesis research on the efficacy of pedagogical knowledge management and to explain its applications and strategies.

Donn (2006) defines urbanization and sustainability in Asia as the plasticenes of the case studies are classified under broad field's or heading were framework for systematically documenting, comparing and deriving lessons of good practice for sustainable urban development. Each good practice assessed the case studies for 12 Asian countries: good governance in proven urban management, effective and efficient infrastructure and service provision, financing and cost recovery, social and environmental sustainability, innovation change and reverence, and international development assistance. The case studies in Thailand were: 1) Muang Klaeng municipality for sustainable city initiative 2) Phichit municipality for waste recycling and 3) Songkla municipality for waste management and education.

III. RESEARCH QUESTIONS

- *How did the current conditions, problems, and needs of producing and transforming Phak Waan Pah occur or how did the researcher find the cooperation from the supporters?*
- *How did the researcher define names for the innovative product and Pak wan tea in the form of a hermetically sealed container?*
- *What is the effectiveness from analyzing the use of Growing and Producing Phak Wan Pah for self-reliance?*

IV. RESEARCH OBJECTIVES

- *To study the current conditions, problems, and needs of the self-reliant learning centers.*
- *To Create a development model for knowledge managers in self-reliance learning centers based on KM, Participatory Action Research (PAR), Sufficiency Economy Philosophy, and growing phak wan pah vegetable.*
- *To promote Small and Micro Community Enterprises (SMCE) of Lao-Sadu Isan Pak Wan Pha in the form of hermetically sealed container 2.5 g.*
- *To compare learning achievement score of pretest and posttest of leaders to find E1 and E2, the effective index of learning center, and the satisfaction of studying and practicing ways to produce and transform Pak Wan tea*

V. RESEARCH FRAMEWORK

The researcher analyzed research and conclusions of group learning by Marquardt (1999: 4-8, 33) and synthesized that the KM framework for group learning is to use learning by doing. It is a process of collaboration, exchanging knowledge, and a powerful process in which small groups of people can work together to solve real-world problems. The researchers divided the KM process into 6 practical steps: 1) Identifying the problems, 2) Establishing the research group 3) Questioning

and reflecting processes, 4) Participatory action planning, 5) Collaborative agreement on research indicators, and gaining knowledge from the team's action learning. 6) Facilitating.

The learning activities and workgroup sessions were based on Rammasoot's (1997: 43-54) observation of collaborative development which has 30 steps, namely 1) selecting the target community, 2) entering the community, 3) integrating into the community, 4)basic social observations, 5) introducing the principles of Participatory Action Research (PAR), 6) identifying problems, 7) suggest the required research cycles, 8) select the problems to research, 9) seek methods and alternatives, 10) planning, 11) accurate, complete and systematic data collection, 12) data analysis, 13) community presentations, 14) action plans, 15) feasibility analysis, 16) conduct pilot projects, 17) trying other methods, 18) reviewing the action plans, 19) seeking resources and staff allocation, 20) monitoring and evaluation plans, 21) setting up a working group, 22) implementing the plans, 23) monitoring the progress of the project, 24) evaluating the project, 25) transforming the research processes into regular development habit, 26) seeking solutions on how to retain the PAR practices in the community, 27) collaborative communication, 28) analyzing the results of implementing participatory action research in the community, 29) publishing a research report, 30) re-applying the participatory action research in future developments in the community.

VI. RESEARCH METHODOLOGY

The research targeted 2 villages communities namely, Ban Khaw Bueng Kui village, Ban Waeng Yai village. The farmers are from an agricultural household who have full ownership of their lands and gardens. The participating farmers volunteered in the research to increase their knowledge in comprehensive agriculture and sufficiency economy processes. A total of 20 families volunteered, whereas 5 families from each village. The qualification for the volunteers was that each had to have at least 2-5 rai of land for growing phak wan pah. The research team partnered with the private higher education institution in the community that acted as consultants and co-researchers in finding collaborative solutions to solve community problems and promote the self-reliance of family and rural communities. The development course has a duration of 4 days and 3 nights and is divided into 19 sub-courses. The sub-courses focus on practical skill development, KM, understanding of self-reliance, and awareness in self-development and potential grounded in the sufficiency economy approach. Once trained, the participants must apply their training and put it into action as knowledge managers at self-reliance learning centers for the next 4-6 months. During their practice and tenure at the centers, the knowledge managers had also to reflect their gained knowledge and experience with their family and community. A total of 15 knowledge managers participated in the project. 8 knowledge managers from Northeastern University, Phak Wan forest, Kosum Phisai District, Maha Sarakham Province, and 7 knowledge managers from Waeng Yai Group, Waeng Yai sub-district, Waeng Yai District, Khon Kaen Province.

VII. RESEARCH PROCEDURES

- *Prepare and construct the required research mechanisms and processes. Observe the target community and knowledge managers. Undertake field trips to observe and collect research data at aquaculture and phak wan pah cultivation learning centers. Create a training course for the development of knowledge managers to cultivate phak wan pah for self-reliance according to sufficiency economy philosophy*
- *Organize a meeting to clarify and create a common understanding and awareness between all the participants. Collaborate and define the success indicators and create the post and pre-development criteria.*
- *Utilize an action workshop of tree diagrams in creating well-being development plans, an operational manual for the project, construct training activities, review of*

family, community well-being development models, and implementation plans.

- *Use action meetings to analyze the conditions of the target community, define the research group's objectives, participatory planning to develop the self-reliance learning center with the additional capacity for innovation and the development of knowledge managers. Organize action learning activities for a schedule of 4 days and 3 nights, and publish an operational manual for the research group and participants. The multi-day course is to be split into two groups of participants. The 1st group includes 21 people from Ban Khao Wa Bueng Kui village and Ban Wang Yao village.*
- *Provide support and encourage the participants to strictly follow the prototype learning activities.*
- *Organize meetings and seminars to improve the knowledge level of knowledge managers.*
- *Follow up and monitor the development progress. Conduct 2 reflection sessions on the results of the project with the participants. The collaborative reflection sessions include the summary observations, questionnaire results, on-line research database, or website.*
- *Organize meetings of empowerment sessions to upgrade the body of knowledge, transfer the knowledge and skills, prepare a summary of the lessons, and gain experiences. Present the findings to the community and participants. Organize activities to improve and develop the community and district.*
- *Exchange knowledge and learn from others by publishing the results of the development model in national and international academic journals and publications.*

VIII. RESEARCH TOOLS

Development Tools: 1) 4 days and 3-night training program as recommended by the 3 local scholars in the target community, 2) operational manual for the development of knowledge managers to cultivate phak wan pah for self-reliance according to sufficiency economy philosophy. The manual and guidelines were constructed through improvement on the manual for the development of lecturers and from sufficiency economy guidelines of Sukhothai Thammathirat Open University, and 5 academic experts.

Data Collection Tools: 1) achievement tests with difficulty levels between .53-.80, individual classification factors between .24 – 79, and the reliability of the whole test was equal to .86, 2) the behavioral assessment of knowledge managers was an improved assessment criterion from the authors' experience in community development, 3) After-Action Review (AAR), forms were revised and adapted from Chantarasombat (2007: 112-125), 4) the satisfaction questionnaires utilize t-test with the individual factors between 2.30-7.00 and the whole confidence value equal to .91.

IX. DATA ANALYSIS

- *Analyze the current conditions, problems, and needs of the knowledge managers and also observe the self-reliance learning centers by organizing workshops and group discussions. The researchers used tree diagrams of the target community and used frequency and percentage as statistical instruments.*
- *Training seminars were used to improve the knowledge of participants, to support deep learning and wine recommended for courses that require discussion and critical thinking (Al-Adawi, 2017). The level of gained knowledge and understanding were measured by using standard tests. Practical skills were measured by using behavioral assessments. There were a total of 73 sub-indicators that were used as success indicators for the research. Training satisfaction was measured through the questionnaires by using statistical instruments of mean average, standard deviation, t-test (dependent), effectiveness index.*

- *Qualitative data analysis utilized After-action Review (AAR) to reflect individual and group performance.*

X. RESEARCH FINDINGS

10.1 Self-reliance Learning Centers

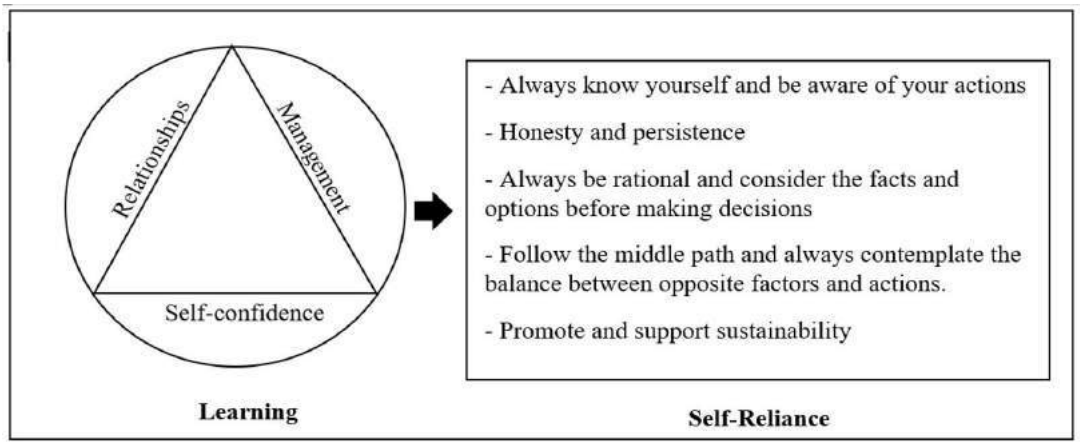

Figure 1: Learning towards Self-reliance

The self-reliance learning centers in Maha Sarakham province, Nakhon Ratchasima province, and Khon Kaen province provide education and training to individuals and community groups to be self-sufficient and self-reliant (figure 1). These centers can be classified into 1) integrated farming, 2) production of rice seedlings, 3) growing herbal plants, 4) rubber plantations, 5) tree farms, 6) animal husbandry, 7) aquaculture, 8) growing phak wan pah vegetable, 9) growing lime, and 10) bio-organic fertilizer. The learning centers are prepared to provide vocational training courses but are lacking systematic management. The disorganized management processes are not worthwhile because it creates insufficient action learning and poor results. All self-reliance learning centers have highly qualified knowledge managers and teachers with tacit knowledge but lack appropriate sufficiency economy philosophy and lack organized KM to transform tacit knowledge into explicit knowledge. The fieldwork, coordination, and collaboration with the knowledge managers of the learning centers, and participants revealed the following strengths, weaknesses, problems, and development obstacles.

Strengths: The positive aspects that the self-reliance learning centers include 1) all the learning centers are not built on rental property or the land is not mortgaged by the owners, 2) the learning centers utilize family and community employees, 3) the agricultural centers utilize a large variety of integrated farming techniques, 4) the knowledge managers are confident, and taking action, 5) they do not use chemical fertilizers and use organics that are produced by the center. The plantation center utilizes minimum chemicals in the production processes.

Weaknesses: The known weaknesses of the knowledge managers and the weaknesses of the learning centers are as follows: 1) learning

center managers lack proper financial planning and debt restructuring knowledge, 2) the learning centers lack continuous revenue and proper accounting practices, 3) lack of facilities such as restrooms, accommodations and seating to service a full capacity of students and visitors, 4) lack of success indicators to measure the efficiency and the quality of the learning center, 5) lack of knowledge, intellectual skills, and awareness in organic fertilizer, 6) lack of KM processes grounded in sufficiency economy philosophy, 7) Besides phak wan pah vegetable, few native plants in the region can also create added value.

XI. TRAINING COURSE DEVELOPMENT

The authors adapted the framework and processes of Participatory Action Research (PAR) and action learning from Nonaka & Takeuchi (1995: 57 - 59) and Chantarasombat (2010: 18) in figure 2.

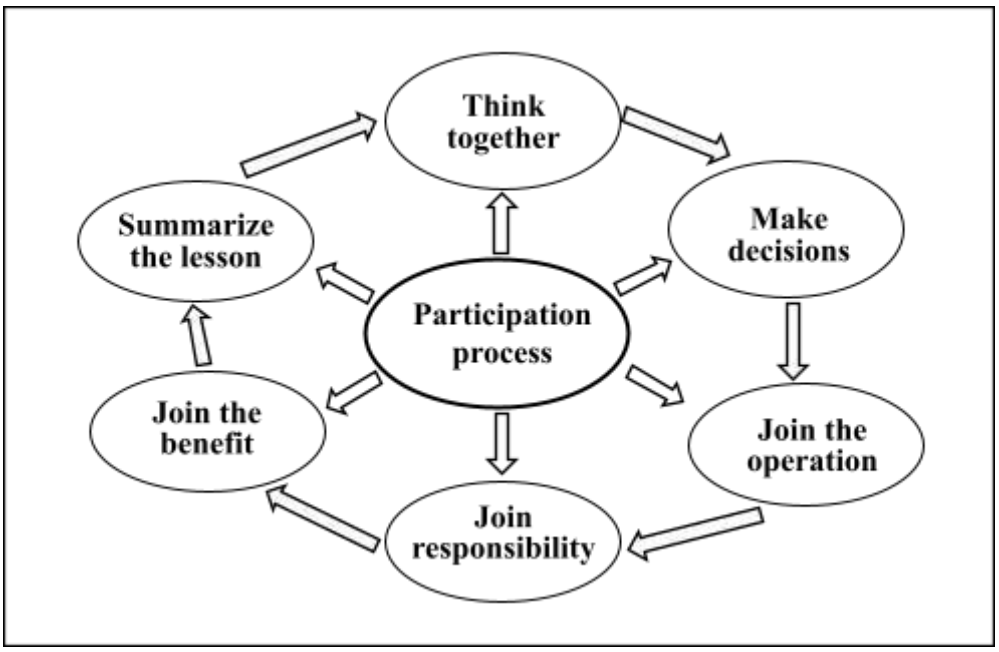

Figure 2: Participatory Action Research Model

Three research participants also suggested additional requirements.

Mr. Chan Thi Prathumpha: The curriculum for self-reliance learning centers must include 1) Training and vocational field tours, 2) Alternate concepts and solutions, 3) Changing crisis into opportunities, 4) Using moral principles, 5) Team building and joint planning, 6) Action, and 7) summarizing and making improvements as a team.

Mr. Sawang Manolai: The development of the learning centers should include the following 5 concepts 1) study and analyze the problems of the community, 2) brainstorming solutions to the common problems in the community, 3) search and construct a good community development model that is practical and tested 4) KM according to sufficiency economy philosophy, 5) establishing a career group in the community to develop through the philosophy of the sufficiency economy.

Mr. Suthat Usaphonthian: The curriculum should include these 9 concepts 1) Joint planning, 2) Practice, 3) Learning from nature, 4) Reduce costs, 5) Debate and exchange knowledge, 6) test the plan, 7) Conclusions, 8) Build networks, and 9) Have morals (Usaphonthian, 2016).

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XII. DEVELOPMENT MODEL FOR KNOWLEDGE MANAGERS

The integration and application of KM processes into an organization requires the capturing of knowledge, making the attained knowledge available, application and safeguarding the knowledge to be passed on in the future (Jennex, 2005). Action Learning and KM model used to construct a preliminary development model included 6 steps (figure 1) which start from 1) Team preparation, 2) Study of the current situation and conditions, 3) Participatory Planning, 4) Doing through action, improvements and development, 5) Reflection and results, and 6) Knowledge sharing.

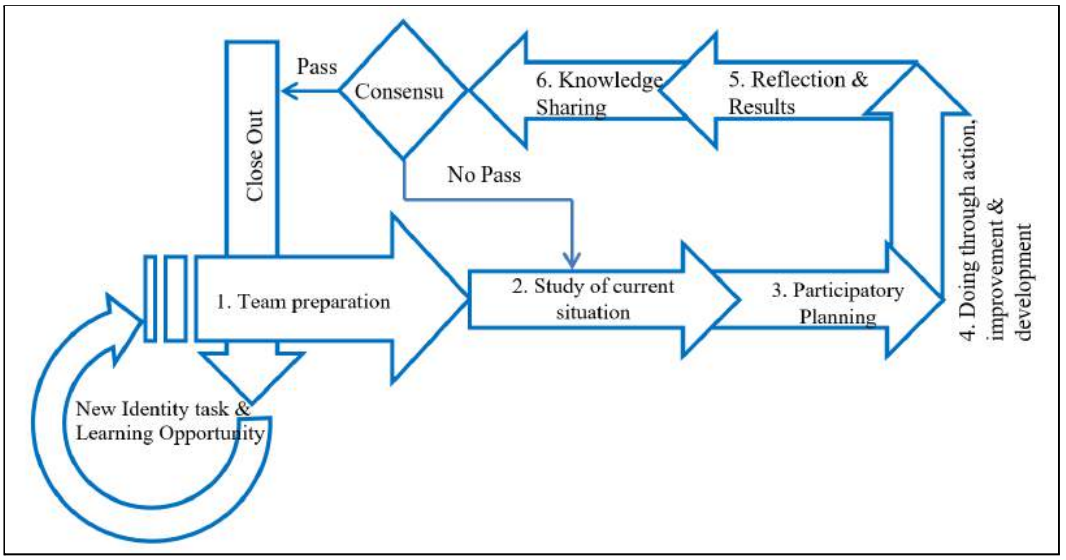

Figure 3: Action Learning and Knowledge Management

The development model for knowledge managers of self-reliance learning centers used Participatory Action Research (PAR). The authors designed the processes of the model as follows Planning (P), Practice (D), Examination (C), Improvement (A), and exchange of knowledge (S). The researchers elaborated and implemented the preliminary development plan which comprised 9 steps shown in Figure2 and finalized development model in Figure 4-5.

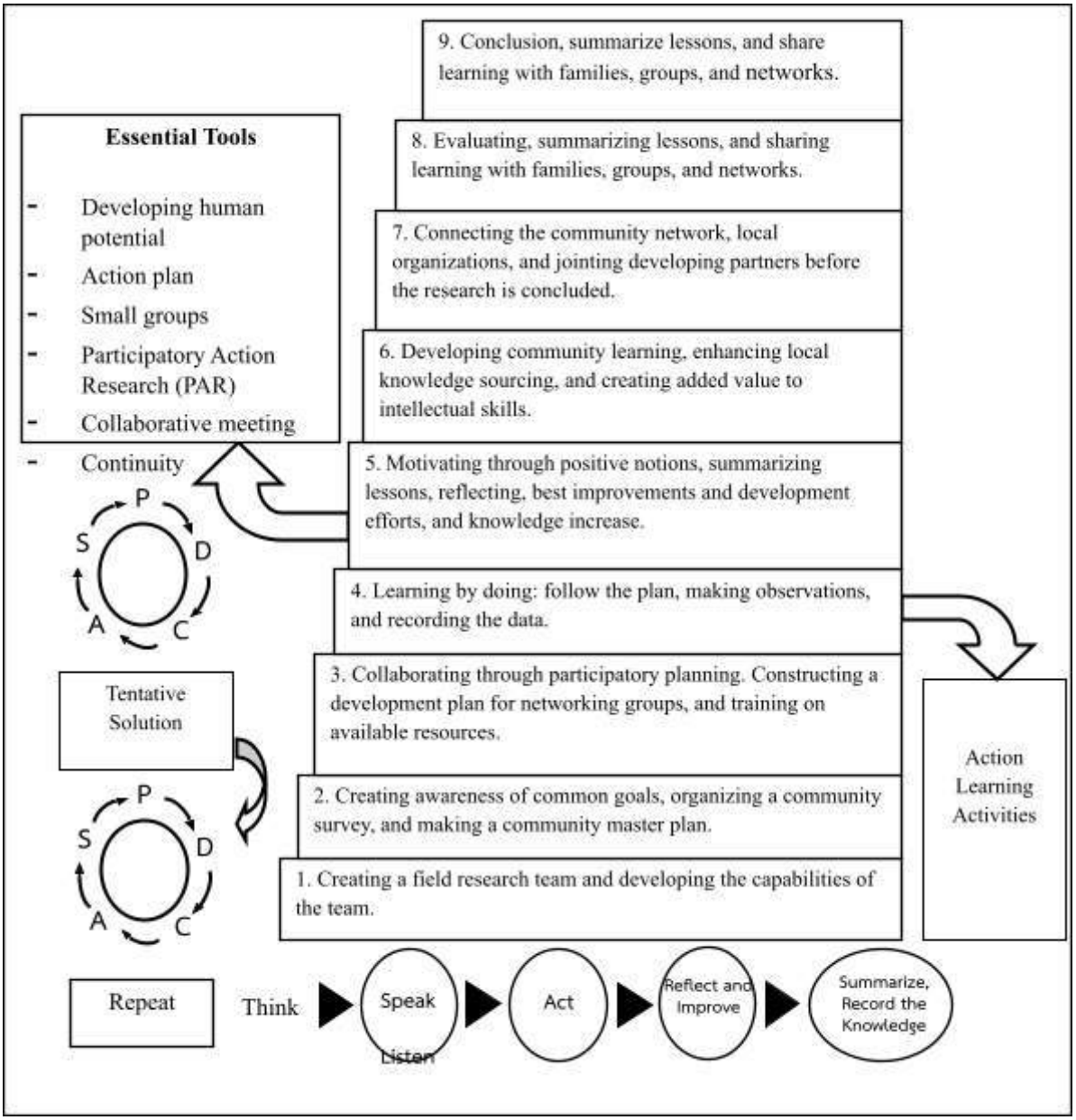

Figure 4: Preliminary Development Model for Knowledge Managers

The development plan included the following 9 steps.

- *Creating a field research team and developing the capabilities of the team through field trips to model villages and self-reliance learning centers.*
- *Feasibility analysis, creating awareness of common goals and organizing a community survey.*
- *Collecting data on the current conditions and requirements of the research target. Collaboration through participatory planning. Construct a development plan for networking groups, and training on available resources.*
- *Data analysis.*
- *Participatory plan making as a team effort. Motivate through positive motions, reflection, best improvements and knowledge increase.*
- *Action plan for developing community learning, enhancing local knowledge sourced, and creating added value to intellectual skills.*
- *Potential development and upgrading the body of knowledge, connection of the community network, local organizations, and joint development partners.*
- *Following up and evaluating*

- *Conclusion, summarizing lessons, and sharing learning with families, groups, and networks.*

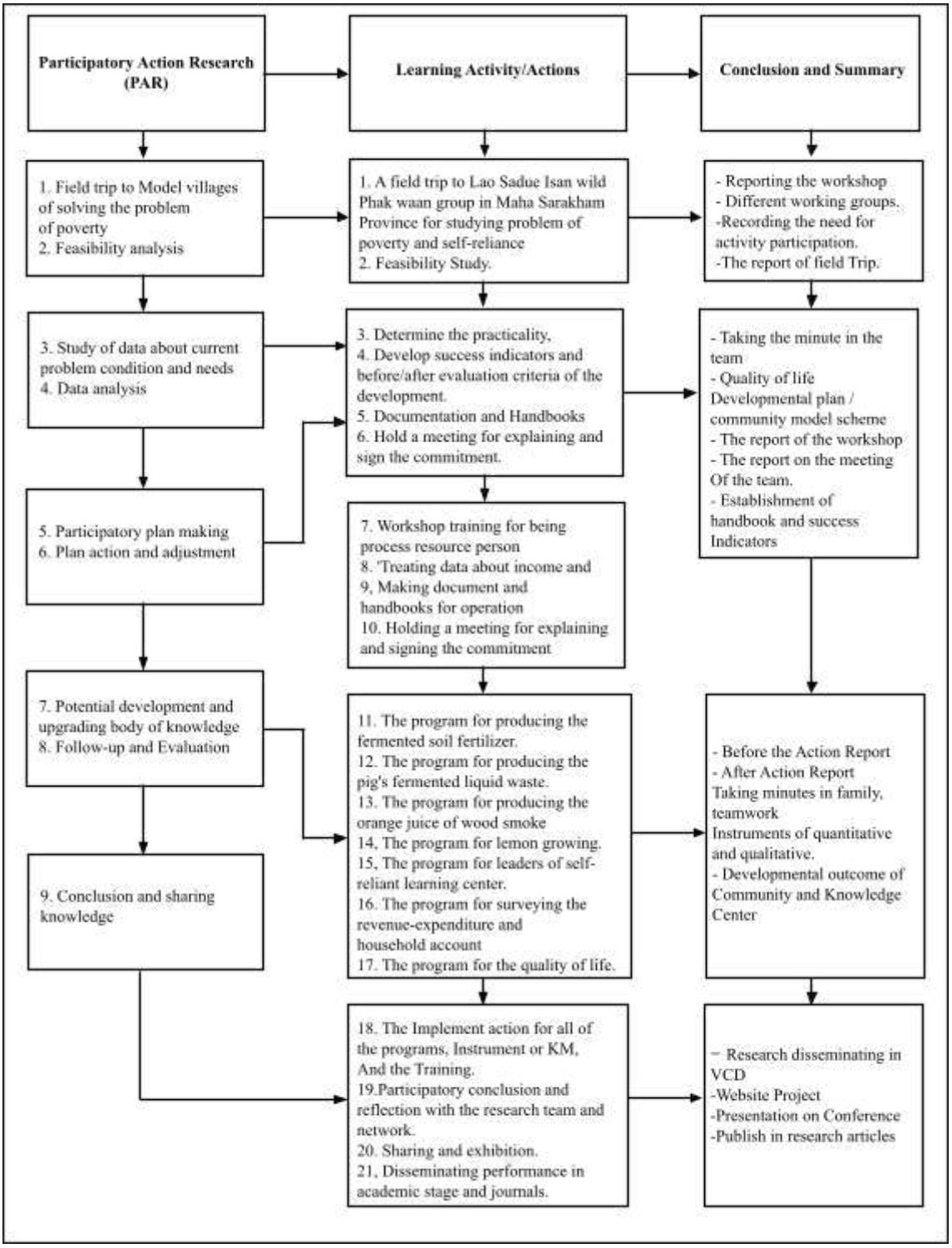

Figure 5: Development Model for Knowledge Managers

The participants of the self-reliance learning centers successfully completed their training in growing phak wan pah. They were satisfied, at the "Highest Level", with the workshops, lecturers, trainers, skill training, and training facilities. The implementation of the development

course lowered expenditures and increased the incomes of the participating families. The results detailed significant progress from pre-development to post-development at .01 level. The follow-up, monitoring and evaluation was organized during the learning process through the action learning activities in the plan with the results detailed in Table 1:

Table 1: The results of the collaborative project for Development of Learning Research Leadership for Learning of Community phak wan pah for Self-Reliance based on KM, PAR, and Sufficiency Economy Philosophy.

Evaluation Item	Comparison of Results of Operation	Household Number	$\bar{X}$	(S.D.)	t	sig
Overview of 2 Villages	Post Operation	14	3.69	0. 39	3.01	.005**
	Pre-Operation	14	3.18	1.00		

Table 2: Household Incomes

Evaluation Item	Comparison of Results of Operation	Household Number	($\bar{X}$)	(S.D.)	t	sig
Overview of the development for solving the problem of household poverty	Post Operation	15	3.62	0.44	3.16	.003**
	Pre-Operation	15	3.04	1.04		
Decreasing the household expenses	Post Operation	15	3.59	0.46	2.85	.007**
	Pre-Operation	15	3.07	1.01		
Increasing Household incomes	Post Operation	15	3.94	0.56	4.78	.000**
	Pre-Operation	15	2.94	1.12		
Providing the opportunity for increasing household incomes and products	Post Operation	15	3.98	0.55	2.82	.008**
	Pre-Operation	15	3.45	1.261		

** Significant difference of .05*
*** Significant difference of .01*

Table 3: Overview of the Development of Household Society

Evaluation Item	Comparison of Results of Operation	Household Number	($\bar{X}$)	(S.D.)	t	sig
Overview of the Development of Household Society	Post Operation	15	3. 71	0.37	2.63	.012**
	Pre-Operation	15	3.29	0.85		
Development of Human Resources of the household member	Post Operation	15	3.36	0.58	2.39	.022**
	Pre-Operation	15	2.76	1.24		

Religion, culture, and custom of the household members	*Post Operation*	*15*	*3.74*	*0.47*	*3. 27*	*.002***
	Pre-Operation	*15*	*3.11*	*0.86*		
Education of household members	*Post Operation*	*15*	*3.78*	*0.71*	*2.80*	*.008***
	Pre-Operation	*15*	*3.11*	*0.47*		

** Significant difference of .05*
*** Significant difference of .01*

Table 4: The Development of Well being

Evaluation Item	*Comparison of Results of Operation*	*Household Number*	*($\bar{X}$)*	*(S.D.)*	*t*	*sig*
The Development of Happiness Condition of Household Members	*Post Operation*	*15*	*3.76*	*0.46*	*2.44*	*.020***
	Pre-Operation	*15*	*3.39*	*1.016*		
Sanitation of Household Members	*Post Operation*	*15*	*3.74*	*0.52*	*2.90*	*.006***
	Pre-Operation	*15*	*3.11*	*1.36*		
Environmental Sanitation in Household	*Post Operation*	*15*	*3.78*	*0.47*	*4.04*	*.000***
	Pre-Operation	*15*	*3.11*	*1.01*		

** Significant difference of .05*
*** Significant difference of .01*

The results of the training course were based on concepts and theories focusing on knowledge building. Understanding and learning through practice A practical and effective trial of the Knowledge Management Leaders Center for Self-Reliance Learning in accordance with the developed sufficiency economy approach. The details are as follows.

Table 5: Process Efficiency vs. Effectiveness of Results for Developing Knowledge Managers

Number	*Name-Surname*	*Pre-test (60)*	*Practical Score for program*							*Post-test (60)*
			Administration (20)	*Compost (20)*	*Master Plan (20)*	*Business (20)*	*Red mite (20)*	*Wild sweet vegetable (20)*	*Total practical (120)*	
1.	*Mr. 1*	*23*	*18*	*16*	*17*	*17*	*18*	*18*	*102*	*54*
2.	*Mr. 2*	*25*	*18*	*19*	*18*	*17*	*18*	*19*	*109*	*52*
3.	*Mr. 3*	*26*	*17*	*18*	*15*	*17*	*17*	*18*	*102*	*46*
4.	*Mrs. 4*	*21*	*17*	*18*	*17*	*18*	*18*	*18*	*106*	*48*
5.	*Mr. 5*	*21*	*18*	*19*	*18*	*18*	*18*	*17*	*108*	*45*
6.	*Mr. 6*	*28*	*18*	*19*	*17*	*17*	*18*	*18*	*107*	*49*
7.	*Mr. 7*	*24*	*20*	*19*	*20*	*20*	*17*	*18*	*114*	*48*
8	*Mrs. 8*	*24*	*16*	*18*	*16*	*18*	*16*	*18*	*102*	*50*
9.	*Mr. 9*	*23*	*18*	*18*	*17*	*17*	*18*	*18*	*106*	*52*
10.	*Mr. 10*	*26*	*19*	*17*	*18*	*19*	*17*	*18*	*108*	*51*
11.	*Mrs. 11*	*23*	*19*	*18*	*20*	*20*	*17*	*18*	*112*	*50*
12.	*Mr. 12*	*22*	*19*	*17*	*17*	*17*	*17*	*17*	*104*	*51*
13.	*Miss 13*	*25*	*17*	*19*	*18*	*18*	*18*	*19*	*109*	*50*
14.	*Mr. 14*	*28*	*18*	*17*	*18*	*18*	*19*	*17*	*107*	*52*

15.	Miss 15	26	18	17	17	18	17	18	105	51
Total		365	270	269	263	269	263	269	6,646	749
$\overline{X}$		24.33	18.00	17.93	17.53	17.98	17.53	17.98	106.73	49.93
S.D.		0.79	0.56	0.56	0.56	0.56	0.56	0.56	0.54	0.67
$\overline{X}$ %		40.56	90.00	89.67	87.66	89.67	87.66	89.67	88.94	83.22

From Table 5 it was found that the results of evaluating the efficiency of the process and the efficiency of the results of the development of learning resource leaders in planting wild mustard greens. The overall efficiency of the process on the efficiency of the results was 88.94/83.22 which was higher than the criteria at 80/80.

The effectiveness index for the program was at 0.7178 which explained the resource leader's higher knowledge 71.78%.

XIII. DISCUSSION

The 10 learning centers were successful in providing knowledge on how to reduce expenses, increase incomes, and how to be self-sufficient. The classification of the learning centers on the vocational skills that were taught at these centers are consistent with Luepanya (2012: 195-196) who conducted a study on sufficiency economy philosophy and self-reliance learning centers in 2 villages. There were a total of 7 self-sufficiency learning centers, which are 1) integrated farming, 2) rice seed planting, 3) herb planting, 4) rubber planting, 5) tree planting, 6) animal husbandry, and 7) fish farming. The identical vocational skills taught at the learning centers in different provinces are similar because the research area was conducted in northeast Thailand which shared similar resources and the vocational skills were proven and practical in the region. There are many self-reliance learning centers throughout Thailand that provide vocational skills but lack proper KM, lack basic resources such as proper bathrooms for students, lack lodging, and have poor customer service. The efficiency of the curriculum of the research through PAR is higher than previous learning centers because of the collaboration between academics, experts, and participants. The combined knowledge of the project is an example of the greater benefit that can be achieved through KM, PAR and action learning. Similar results where knowledge and cultural capital exists, but lack KM was observed by Kampang (2014: 200) in which 6 self-reliance learning centers in Ku Ka Sing sub-district, Kaset Wisai District, in Roi Et province lacked proper development. The 6 learning centers include vocational skills in 1) Indigenous silk textiles weaving, 2) New theory agriculture practices, 3) Indigenous museums 4) Indigenous folk literature 5) Khmer archaeological sites, and 6) Don Phu Ta (grandfather mound cultural grounds). These learning centers have the cultural capital in their community but lack systematic management and KM processes.

Evaluation of the development model and curriculum by 5 experts found that the overall curriculum was appropriate, feasible, and useful at the highest level. The authors believe that the curriculum and overall project was successful because the trainees gained practical knowledge from action learning activities. Action learning improves the ability of managers to develop integrative, win/win solutions to conflict situations (Leonard & Marquardt, 2010). The activities were based on the student's interests which encouraged participation. The curriculums were based on sufficiency economy philosophy and are the fundamental principles on which self-sufficient learning centers base their operations. The self-reliance learning center of Mr. Chan Thi Prathumpha is based on the principles of sufficiency economy philosophy namely, 1) Training, 2) Adapting/changing concepts, 3) Turning crisis into opportunities, 4) Leading life by following moral principles, 5) Team building, 6) Taking initiative, and 7) Collaboration in summarizing, improving and development of the gained knowledge. Similar approaches and principles of sufficiency economy philosophy were also applied by Mr.

Suthat Upaphonthiens' learning center, but the principles were expanded to 9 elements which are 1) Participate in the planning, 2) Take action, 3) Learn from nature, 4) Lower expenditures, 5) Debate and exchange ideas, 6) Trials and errors, 7) Summarize the results, 8) Create a network, and 9) Be virtuous. The progress and benefit from collaborative efforts far surpasses any individual efforts. The knowledge gained from participatory effort is the most important and effective KM in the community. Wasi (2002: 21) states that one person's learning is not enough to make any credible accomplishment because other people, organizations, and institutions are not involved in the learning. The benefits of collaboration in community projects establishes a positive atmosphere for modeling and practicing cooperation, and develops learning communities (Panitz, 1999). The experts who evaluated the quality of research tools were generally found appropriate and has the highest level of usefulness because the learning activities were based on self-reliance and sufficiency economy principles of 1) knowing one-self and goal setting, 2) Knowing the resources and community collaboration, and 3) creating added value and filling for patents and intellectual property claims.

The pilot curriculum of the learning center for knowledge managers includes theoretical courses (Chantarsombat, Boobpamala & Songsri, 2018) to knowledge building courses, learning by doing, and action learning practices. The curriculum was overall successful. The effectiveness index is 86.59 / 80.75. This is consistent with Smith (2001: 3947-A) in which preparing an effective lesson plan is a part of good teaching. An effective lesson must include inquiry-based learning tools to achieve important goals. The process involves dividing the lesson into two phases. The first phase is the planning. The second phase is teaching by following the guidelines of the prepared lesson with inquiry learning activities. The high level of success was due to the curriculum's application of learning by doing and the collaboration of teachers and students in the learning activities. And consistent with the development of learning resource leaders in learning to grow wild vegetables for self-reliance of target groups the results learning outcome were: the efficiency index is 88.94/83.22 with was higher than the criteria at 80/80, and effectiveness index was at 0.7178 which explained the resource leaders center gain higher knowledge 71.78 (Chantarasombat & Agsonsua, 2021), and the same consistent with the development of learning resource leaders in learning to grow wild vegetables for self-reliance of target groups the results learning outcome were: the efficiency index is 88.94/83.22 with was higher than the criteria at 80/80, and effectiveness index was at 0.6667 which explained the resource leaders center gain higher knowledge 66.67 (Chantarasombat & Prasertphorn, 2021). So the curriculum of the learning center for knowledge managers includes theoretical courses completed because the goal for achievement are Cognitive domain, Affective domain, Psychomotor domain and Skill thinking for lifelong learning too.

Self-reliance learning center administrator's satisfaction with the overall training was at a high level. This may be because the knowledge managers of the centers gained knowledge and confidence through action learning. Action learning is an effective KM technique (Radu, 2012) that self-reliant learning centers can efficiently apply to enhance the body of knowledge of the participants and expand the potential of the participants who are studying or practicing at the centers. The fastest and most effective way of learning is to take some action which later could be used to draw conclusions (Welskop, 2013), and can KM be used in a low technology environment to assist traditional social structures in changing the way knowledge is transferred? This paper suggests it can, while applied in Thai rural content, the practical implication for this research is that any social process that relies on traditional, family based, knowledge pass down approach. (Chantarsombat, Srisa Ard, Kuofie, Murray, 2010), and Chantarasombat (2019: 59). The 32-hour program was carried out in 3 days and 4 nights. The activities provide managers with hands-on experience and the development of

practical skills, vocational experience through field trips, fieldwork, community lifestyle, analytical thinking process, synthesis, how to become a self-learner, and how to apply knowledge in daily life. This is because the activities in the research were based on student-centered learning technique, the content of the subject was correlated and effective because active learning has resulted in positive learning outcomes. Most experts agree that students learn best when they take an active role in the education process (Smart & Csapo, 2007). Other feedback comments included that the teacher was hospitable, sincerely interested in the student's learning, the real intention of transferring knowledge, the students were stimulated and alert throughout the course, explained various contents with clarity, the constant search for new knowledge to present to students, variety of learning and KM subjects. The students enjoyed learning and were a part of their education and learning activities. Learning by doing creates skills and knowledge, causing the students to be satisfied with the results of the local educational administration course at the highest level when the activity was focused on practical skills and engaging activities. Integration KM processes can support manager to proactively respond to highly turbulent environment and will benefit an organization, and the crisis response center (often led by a crisis response manager) deals with various stake-holders during a crisis situation KM is an action discipline; knowledge needs to be used and applied for KM to have impact. Crisis response relies on the use of knowledge from past situations to generate current and future response procedures. Lessons learned and the understanding of what works in given situations (both examples of knowledge) enables emergency managers to prepare planned responses as a counter to the stress of the emergency and to ensure all relevant issues are considered during emergency response decision making (Jennex & Murali, 2009). The beyond student centered learning towards education pedagogies were student centered approaches is an action discipline; approaches the dominant learning theories of the last century giving rise to what may be called student centered learning and human rights arguments giving rise to what may be called student centered education (William, 2011).

The success indicators of household self-reliance are significantly higher at the statistical level of .01. The operations at this stage are aimed at following up and evaluating the successful implementation of the plan. The most important operations in this stage include developing human potentials, knowledge enhancements, monitoring, evaluations, action learning activities, post- development and pre-development evaluations, 73 sub-indicators, and 23 assessments were performed before the field research. The collaboration and involvement of participants working collectively is the true principle of PAR and action learning that sustains collective leadership through the discipline of reflective practice (Raelin, 2008). The post-development levels were higher in every indicator than the pre-development figures because participants worked as a team. Every participant was involved in the analysis, the observations, participated in all planned activities, involved in decision and policy-making, and collaborated on the evaluations and reviews. And an organization's success in all of the stated measures found that the KM initiative/projects perceived to be the most successful had 3.5 and 17 measures met 2.25 dimensions and 12 measures (Jennex, Smolnik, and Croasdell, 2012). And the studies of risk reduction and occupational safety in agriculture 1 sector in Thailand for disaster risk reduction plans in Thailand disaster risk reduction has been a crucial issue in the agricultural sector as the impacts of disaster have long been experienced by the sector with increase in severity in recent years. Various plans aimed to reduce the impact and introduce improved preparedness initiatives have been developed and adopted following the country's acts and regulations related to disaster risk reduction in the agriculture sector. Some of the plans are highlighted below: 1) National Plan for Disaster Prevention and Mitigation 2010-2014 2) Integrated Plan for Mitigating Impacts of Global

Warming in Agriculture Sector 2008-2011 3) First draft of National Climate Change Master Plan (2010-2019) (FAO, 2010) and 4) Plan for Disaster Response in Agricultural Sector by fiscal year (2010) (Bimal. 2011). The findings in this research reveal one important notion that the degree of CSR (Eua-anant, Ayuwat, Promphakping, 2011). Therefore, consistent but it's a small and medium business with the practices, according to international standards, in Thai SMEs is positively related to positive impacts of CSR on internal issues. In other words, in the utilitarian perspective, Thai SMEs are more interested in positive impacts of CSR on internal issues when they engage in an international style CSR agenda where CSR practices can return foreseeable concrete benefits to the businesses. On the other hand, no evidence is found in this research that confirms the relations between positive impacts of CSR on external issues, as well as external support and knowledge of SME owners/managers about CSR, and the degree of CSR practices in Thai SMEs. The study also reveals the present deficiency of external support for Thai SMEs to engage in CSR practices.

XIV. CONCLUSION

The development course was attended by the research group and the knowledge managers of each of the 4 self-reliant centers for a duration of 4 days and 3 nights. Afterwards, they applied the knowledge at their respective centers for the following 4-6 months. The knowledge managers gained new knowledge, new practical skills, have positive attitudes, attained higher KM quality, self-awareness, and efficient resource management, created added value, and self-reliance. On the whole, the efficiency of knowledge management output was 84.58 / 81.65. The effectiveness index was 0.6986. However, large scale cultivation of phak waan pah which provides an opportunity for farmers and rural communities is currently non-existent. The development model on sufficiency economy philosophy helped create a network of agricultural communities with efficient KM processes that raised the production level and incomes of the participants. There are many examples in Thailand of sufficiency economy principles being employed to help develop communities which are more economically successful. This is being achieved through crop diversification, employing more sustainable agricultural practices and developing community rice mills and cooperatives in order to cut out commodity brokers and improve profits (Suebsman, Kelly & Sleigh, 2013). Participants who participated in the growing of phak wan pah vegetable project, owning a farm area of approximately 1-3 rai have a substantial debt reduction and are able to generate income from harvesting phak wan pah for 6-8 months a year. The farmers are able to earn 150-200 Baht per kilogram and potential earnings of more than 100,000 baht per year. Villagers can be self-reliant and can live life on the basis of sufficiency, stability, and be good role models. The participants initially joined the project as volunteers, then become knowledge managers in self-reliance through the PAR process, and have a sustainable development establishment grounded on the philosophy of sufficiency economy.

And the program could enhance understanding attitude, and skills of learning management a pilot project had indicators, retention in learning after studying 2 weeks in action learning challenge of secondary teachers in the development of self- learning module of entitled "Doctoral Program Learning Module on Developing Leading Secondary School Teacher in Creative Thinking for enhancement of Students' Learning Activities in Thailand. (Chantarasombat & Sombatsakulkit. 2021: 138-149) So the same study is entitled "KM, PAR, Sufficiency Economy Philosophy, and Growing Phak Wan Pah for Self-reliance. An analysis of the nutrient testing results from large and small leafy wild vegetables in the amount of 200 g / bag were examined on August 28, 2020 to September 23, 2020, and found that they were antioxidant vegetables. Nourishing the body in 100 grams contains the macronutrients calcium = 6,185 mg / kg, phosphorus = 1,235 mg / kg and vitamin A = 247.23 mg / kg. And teeth Have a good call and cure allergy for the Great Northeastern University Blackout innovation for tea of

double-high quality (http://www.central lapthai.com/TRKK63/13602/23 SEPTEMBER 2020). Also, many were surprised at the lack of service and at how nice it was not to technology for a while. While not the purpose of this paper, it is worth noting that a short duration blackout was actually considered kind of fun (Jennex. 2012: 62). Most respondents focused on either their cell/smart phone service/experience or on experience. A having the food Patent in the name of "Phak Wan Pah Palang Song Cha-nid Song" or ``Double Energy for Pak-wan tea" no. 44-2-00064-2-0001 on May 13, 2021 which will be in the hermetically sealed container. This could gain more income through a mixed-research method which using participatory approach promoted 11 topics of agriculture network, and online learning on Pak-wan plaiting.

XV. RECOMMENDATIONS

15.2 Recommendations for Implementing the Knowledge Manager Development Model

Development course for knowledge managers in learning to grow phak wan pah for self-reliance grounded on the philosophy of the sufficiency economy had a schedule of 32 hours. There are a total of 19 sub-courses which are linked to workshop and group activities. The operational manual of the course is to be strictly followed by the participants.

15.2 Recommendations for Future Research

There should be ongoing, participatory action research with the target community for at least 1 year. An extended research period will increase the efficiency of the development guidelines and processes. It will also reveal the development at the household level and at the group level of a learning community with follow-ups and ongoing reflections to improve the process. The local administrative organizations of Kosum Phisai District (Maha Sarakham Province), Khu Khad sub-district administrative organization, Khong District, (Nakhon Ratchasima Province), and Waeng Yai sub-district administration organization, Waeng Yai District (Khon Kaen Province) should support ongoing research projects.

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Note 1: Appendix: Photo producing "Phak Wan Pah Palang Song Cha-nid Song" Faculty of Education, Northeastern University and Community Enterprise of Loa-Sadu Isan Phak Wan Pah Group.

APPENDIX

AUTHORS' BIOGRAPHICAL NOTE

Chalard Chantarasombat is an associate professor at Northeastern University and head of the research unit of Strength Community and Knowledge Management RUSCKM). Chantarasombat's specialties are education and nonformal education, research community and development, knowledge management in the community, network organization and group process effectiveness, innovation for learning Module and program creative thinking on educational administration and leadership to students and teachers. Professor Chantara sombat serves as the Knowledge Management Systems Track Conference co-chair at the 1st International Conference Education Reform 2007, Sofitel Raja Orchid Hotel, Thailand and the 2nd International Conference Education Reform 2009, themes "Cultural Diversity and Sustai-

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The Monitoring of Integrated Enhancement of Health Program and Development of Health Mechanism at Area Level: A Case Study Dansai District, Loei Province in Thailand

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ABSTRACT

The purposes of this research were: 1) to follow up the evaluation through Application of Health Impact assessment of Health Program and Development of Health and 2) to develop integration guidelines for the cooperation between the committee on the Improvement of the Quality of Life at district level and Sub-District Health Fund. The results shown: 1. The affective factors of the Integrated Enhancement of Health Program and Development of Health Mechanism at district level project were: 1) the aspect of Quality of Life Development committee from 11 members, 2) the aspect of environment, and 3) the aspect of mechanism supporting learning and participating processes, 2. The outcomes from 12 issues on working plans, 36 health promoting projects, and 11 online follow-up evaluation plans, 3. The results showed the quality of life of committees, the project at district level for integrating work, and the quality of life development committee for both district and sub-district levels, 4.

Keywords: follow-up evaluation, health impact assessment evaluation, integration, health promotion, health mechanism, development of quality of life.

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Keywords: follow-up evaluation, health impact assessment evaluation, integration, health promotion, health mechanism, development of quality of life.

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I. INTRODUCTION

1.1 Rationale

Based on His Majesty the King's principles for working is Self-Sufficiency Economy Philosophy, the main purpose of this philosophy was to strengthen Thai society. through the three aspects of self-reliance and equilibrium consisting of 1) the quality society, 2) the society of wisdom and 3) the learning and caring society. Sufficiency Economy Philosophy is a guideline of dealing with problems from one prominent aspect of the royal speech by His Majesty King Bhumibol Adulyadej who is the world's longest-reigning monarch. The sufficiency economy philosophy offers a balanced and sustainable development approach needed for the current situation replacing the old sustainable development approach (Chalard Chantarasombat, 2020: 69).

Regarding the application of the sufficiency economy, it was found that the sufficiency economy concept applied to all education levels. However, there are a few limitations for implementing in some activities or projects which must be considered about ages and period of the project operation. The new teaching should apply the sufficiency economy and focus on resource management as a self-reliant approach which is similar to the 12th National Economic and Social Development Plan (2016-2021). This plan was developed based on strengthening the country for both human capital and society, while the philosophy of sufficient economics was applied in the plan for the purpose of promoting a peaceful and harmonious society. Therefore, the strategy for the development of Thai people and society was emphasized on human quality development. It is necessary to develop the quality of people in both morality and knowledge including logical thinking, having consciousness of morality, virtue, being aware of changes, being able to make decisions using the principle of modesty in ethical life, patient and diligent as the protective immune system to get ready for everyone changes to the experience, living with dignity, and having economic and social security and living in a warm family and a peaceful society (Office of the National Economic and Social Development Council, 2016: 47). The integrated project to operate health promotion tasks and develop health mechanisms aimed at developing the potential of working teams from the Office of the Thai Health Promotion Foundation (ThaiHealth), National Health Security Office (NHSO), and the Ministry of Public Health to promote local health insurance funds. The goal was to help reduce the redundancy of work and to expand the larger scope of working areas with a limited budget.

Regarding the objectives and goals of the project, the action plans were divided into 2 major plans. The first one was for developing team potential, a joint mechanism to drive health promotion projects, the increase of the number of mechanisms to promote health and develop potential, and the understanding and skills in coaching. The monitoring and evaluation of the project were divided into 2 levels which were: the district level and the area one. The district-level consisted of 12 main mentors who were the representatives from 12 districts consisting of the Fund Committee and the staff who was responsible for the project. There was a consultation clinic for project development and implementation and an online project evaluation system.The second plan was the implementation of a pilot study in the area where there were local health insurance funds. For the second work plan, the pilot areas were selected from the

districts in 76 provinces of Thailand that have implemented the district quality of life development funds project, and There were a total of 770 funds; (5 Sub-district Health Promoting Hospital/821 funds in pilot areas).

1.2 Background

The implementation of an integrated project to operate health promotion work and to develop a health mechanism at area level aimed at achieving 7 aspects including Aspect 1, to obtain information about health problem situation and solution for ~~of~~ solving problems, Aspect 2, to create the plan for dealing with the problems, Aspect 3, to improve the quality of the projects, Aspect 4, to obtain the ability to synthesize the results and values, Aspect 5, to receive the ability to conduct a real-time monitoring process of the project, Aspect 6, to do a report of project operation, and Aspect 7, to have a database for the utilization in future.

There were 36 sub-district level funds of the implementation of the integrated health promotion projects and the development of the health mechanism at the area level, the Health Area 8, including 1 fund in Udon Thani municipality, 6 funds in Nongbua Lamphu province, 19 funds in Sakonnakorn province, and 10 funds in Loei province, The work plan was divided into 5, ones which were: 1) organizing the working group meeting at the district level, 2) establishing the board of potential of the subdistrict, district, and municipalities quality of life development committees in 11 areas, 3) classifying the project design, defining indicators of joint operations, and signing an MOU, 4) implementing the Tambon Health Project according to the fund plan and expanding their responsibilities to cooperative partners, 5) monitoring the areas, and 6) organizing the forum for lesson summary of districts and sub-district/ municipalities levels.

Consequently, to eliminate the above weaknesses and limitations by pushing forward the project works efficiently, the evaluation during the implementation was done by applying 6 steps of Health Impact Assessment (HIA) which were: 1) screening, 2) setting the scope and approaches, 3) evaluating, 4) reviewing the draft report, 5) developing proposals for improvement, and 6) monitoring, evaluating and revising (Pongthep Sutheravut, 2020: 55). The Dan Sai District Quality of life development of Loei Province under the Health Area 8 was chosen as the operating area for determining the factors of health as an important conceptual framework for the project evaluation.

II. RESEARCH OBJECTIVES

Research Objectives were as follows: (1) To monitor the evaluation of the project operation by applying the Health Impact Assessment (HIA), Integrated Enhancement of Health Program and Development of Health Mechanism at Dansai District of Loei Province under the Health Area 8. (2) To create a guideline for the integration of work between the quality-of-life development of health funds at the sub-district, district, and municipality levels.

III. RESEARCH METHODOLOGY

3.1 Project Screening

3.1.1 Objective

To set goals, importance, and benefits of HIA Project Assessment for stakeholders of Project

3.1.2 Process

The assessment team recognized the project details and evaluation process, whereas, the target areas were informed of the objectives of the program. Moreover, they were introduced to the project in terms of the assessment framework, criteria, scope, tools, and methods of assessments by the assessment team before having a discussion.

3.1.3 Participants

The quality of life development committee of district and province level, mentors of regional level mentors of area level, fundraising team, target group, project presenters, and project manager of the sub-district health fund (representatives from community, staff from sub-district health-promoting hospital), and assessment team.

3.1.4 Instrument

Online meetings and workshops.

3.1.5 Results

The participants understood the primary processes (Health Impact assessment: HIA), recognized the importance, and benefits of the project assessment, and took part in program assessment planning.

3.2 Scope

3.2.1 Objective

To set up the framework, assessment issues, and indicators engaging with local target groups.

3.2.2 Conceptual framework was illustrated as follows: The Implementation framework of the Evaluation of Integrated Enhancement of Health Program and Development of Health Mechanism through the application of Health Impact Assessment by Pongthep Sutheravut (2020).

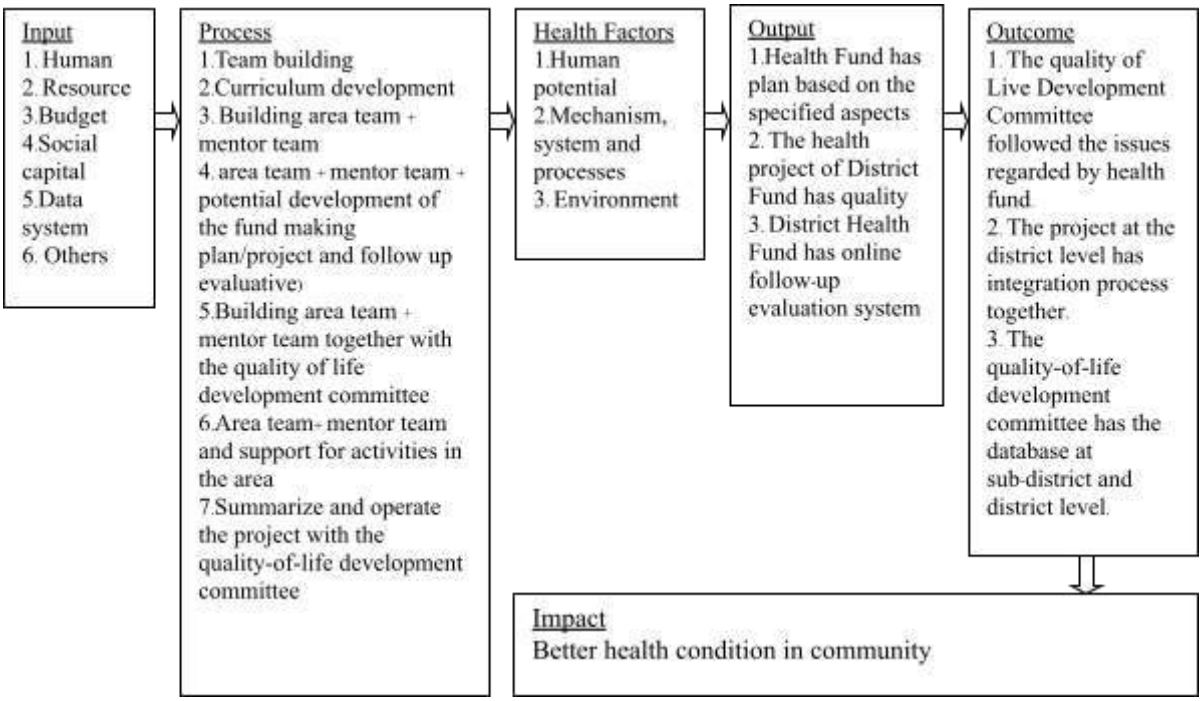

Figure 1: Research conceptual framework

3.3 Processes, Indicators, Participants, Informants, and instruments were as follows :

Table 1: Scope of the Evaluation

Assessment Issues	Indicators	Stakeholders	Area	Instruments	Notes
1. Enhancing teamwork and potential	*- Elements - Team building process -Responsibility Positioning - Team target*	*- Regional correspondent - Mentors at district level - Provincial Health Promotion foundation/District Health Promotion - National Health Security Office (NHSO).*	*Health Area 8*	*- Meeting - Focus group interview*	
2. Correspondence with the quality-of-life development committee at district level	*- Processes -Decision/Team conclusion - Guidelines, team working plan*	*- Chairperson/Secretary of the Quality of Life development committee - Mentors at district level - Correspondent at regional level*	*Dansai District, Loei province*	*Interview*	
3. Planning development/ project and monitoring assessment	*- Content, curriculum and process -Participants and selection*	*- Mentors at the district level - Correspondent at regional level*	*Dansai District, Loei province*	*- Group interview - report - interviewing the participants*	

Assessment Issues	Indicators	Stakeholders	Area	Instruments	Notes
4. Support for plan making	-processes/ methods - instruments - improvement, development and problem solution	- Mentors at district level - Money foundation manager Correspondent at the regional level	10 Health foundations	- Group interview - Report - Interview	
5. Database, circumstances, and plan	-Thedata contained in the program -file document/report -Qualityinformation, circumstances and plan	- Chairperson/secretary of the quality of life development committee - Mentors at the district level - Money foundation manager	10 Health foundations	-Observation - Checklist - Meeting platform	
6. Plan following a specific issue	-Numberand quality of issued -based plan -Datastored online program	- District mentors - Health fund responsible persons - area correspondents	10 health foundations	- Monitoring the program - group interview - reviewing plan	
7. Project quality	-numberof project proposals in -corresponding the foundation -Development processes -Guidelines, activities, and responsible person	- Responsible person of Health foundation - Project presenter at sub district level - Foundation administration at sub district level	10 health foundations	- meeting platform - group interview	
8. Integrated plan of quality-of-life development committee at the district level	-Increasing number of plans - then number of approved plans -Responsible person for plans	- Chairman/secretary of the Quality of Life development Committee - Mentors at the district level - responsible person for the foundation at sub district level - Correspondent at regional level	Dansai District, Loei province	-Observation - Online project plan - Interview	
9. Conclusion with Quality-of-Life development Committee	- Processes -aspectof meeting participants - conclusion	- Chairman of the Quality of Life development Committee at the district level	Dansai District, Loei province	-- Interview - report	

Assessment Issues	Indicators	Stakeholders	Area	Instruments	Notes
	system/mechanism	- secretary of the Quality of Life development Committee - Mentors at the district level - Correspondent at the regional level			
10. the Better state of health	-Participation of the presenter and the target group - Ratio of the target group - Group building by the project presenters	- Foundation board - project presenters Mentors at the district level - Correspondent at the regional level	Dansai District, Loei province	- Interview	

IV. RESULTS

4.1 Evaluation process

4.1.1 Participatory data collection

1st data collection. Aspect: Team building and capacity development, developing plans, projects operation, and cooperation between the quality-of-life development committee, the target group, District coordinator, and secretaries of the Quality-of-Life Development Committee at province/ district/sub-district levels through the use of group discussions, interviews, and secondary data or related documents.

2nd data collection. Aspect: project quality, aspect-based plans, situation database, integrated plan, target groups which included the persons who were responsible for the sub-district foundation, sub-district project presenters, sub-district foundation administrator and secretary of the Quality-of-Life Development Committee, and tools which consisted of group interview, interviews, surveys, and online observations program.

3rd data collection. Aspect: supporting of plan preparation, summarizing working guidelines with the Quality-of-Life Development Committee at the district level, and improving the state of health; Target group: chairman or secretary of Quality-of-Life Development Committee at the district level, the coordinator of district level, district mentor, the person in charge of the district foundation and sub-district foundation project presenter; and Tools: forum, group discussion, interviews, and secondary data or related documents.

Data analysis and synthesis processes: Analyzing the obtained data according to the evaluation framework by the working group.

Participants in the evaluation process: Area correspondent, chairperson or secretary of the Provincial Administrative Organization, district counselor, district Health Promotion and National Health Security Office (NHSO), persons in charge of sub-district foundation, Sub-district foundation project presenter, and the district foundation managers.

4.1.2 Review of the assessment report. (1) Process of report review. Conducting a data recovery workshop, analyzing alternatives, proposing suggestions for the development, and assigning the persons in charge. (2) Participants of report review. District coordinator, district mentor, and representatives who proposed the project. (3) Important assessment results.

4.1.3 Revision of the project: (1) Organizing the project proposal to obtain feedback, information exchange, learning, and summarizing guidelines for proposal tracking. (2) Coordinating with the district mentors to propose the agenda and meeting with the Quality of Life Development committee.

4.1.4 Revision of the project Meeting with the team of the Quality-of-Life Development. (1) Foundation committees and mentors to monitor the integrated tasks and each aspect. (2) The follow-up evaluation process is based on the suggestions. (3) The follow-up mechanism for project improvement is based on the recommen- dations and meeting with the team of integrated follow-up process for different aspects.(4) Follow-up methods, project improvement according to the suggestions.

4.2 Evaluation results

4.2.1 Input

1) Human. There were 67 participants as follows. (1) A representative from the Health Security Office, Region 8, Khon Kaen, who was responsible for overseeing the sub-district Health Foundation took a role in giving important advice and sharing knowledge. (2) Team of two mentors was responsible to design processes and tools, organize the forum to clarify tasks, make plans and health projects, use the online data recording program, coordinate the plan with the Quality-of-Life Development Committee, and organize a lesson summary forum. (3) A team of 2 mentors at the area consisted of the Sub-District Health Fund supervisors of the Provincial Public Health Office and another mentor was from district level who participated in the working process, preparing area plans and coordinating with target groups, organizing activities, participating in activities in the area, and coordinating and integrating health foundation plans and projects with the Quality of Life Development committee. (4) There were 30 people of the target groups of the project including the chairperson, the responsible person for the foundation, the police officer, the Health Fund committee, and the stakeholders of the foundation, and 3 representatives from each project. Their roles were to participate in the workshop to develop projects, prepare health foundation projects and record information online, and organize activities according to the project by coordinating with the Quality-of-Life Development Committee.

2) Resources. The resources for the projects were supported by NHSO for improving the quality-of-life development, organizing the meeting, operating the project on the policy from the District Health Security, developing a project to address problems at the sub-district level, and focusing on rapid action from the Local budget for integrating municipal waste and environmental management.

3) Budget: The budget was divided into 2 parts which were: part 1 was focused on human potential development, process, and monitoring implementation of the project, while part 2 was emphasized on the sub-district Health Fund budget as a

supportive budget for the health program of each foundation.

4) Social capital: The Dan Sai area has driven health work using the Health Constitution with the clear driving issues and human capital, a team of speakers to develop the health constitution, and the health foundation mentor team for the effectiveness of the project.

5) Information system: The project had an online data recording program as the tool to support the development plans which was also in the analysis of the health situation.

4.2.2 Process

The project comprised 7 processes including (1) team-building, (2) curriculum development, (3) regional team building and mentor team building, (4) district team and mentoring team for developing the Fund's potential, (5) extending the cooperation with the Quality-of-Life Development committee in the area, (6) mentoring team to support area activities of district level, and (7) Summarizing the work and continue working with the Quality-of-Life Development committee. Steps 1 and 2 were implemented by the central team of the project. The process was started from the 3 steps which were described as follows:

1) Creating a local mentoring team for working with the National Health Security Office (NHSO) to understand the project and implements/ guidelines. The team also participated in selecting the target areas as a pilot one. The team, then, coordinated with the Provincial Health Promotion Office and local area to select the members of the mentoring team. All mentors were trained to develop their potential by the central team who came to the–area to plan and take specific roles. The coaching team members attended a meeting at the District Health Area 8 to clarify the project plan and to integrate the health promotion project and development of health mechanism to the area level in a workshop by working in groups in 4 target areas, of which Dan Sai Quality of Life Development Committee is one of them. Consequently, it was found that creating a local mentoring team was focused on building up the understanding with relevant departments and target working areas of both the National Health Security Office (NHSO), Provincial Public Health, and District Public Health. There was also the recruitment of new mentors in the areas through coordination with various departments to monitor working operations in the health foundation.

2) Foundation Potential Development. The evaluation results could be divided into 2 parts as follow:

2.1) Phase 1: Project development process/plan of fund committee or responsible person. The project, however, could not respond to the local situations established. (1) There were the same projects in some places, but the problems or situations were changed all the time. (2) The period for developing work plans was short because it exceeded the fiscal year. The director teams have not yet been assigned, but the budget has proved too early. Therefore, it was a must to operate the project urgently. As a result, some places implemented the same projects without the development and updated regarding the current situation. (3) Potential project presenter was important for supporting the project with skills and ability to design the projects–and to develop plans effectively. On the other hand, general villagers had no specific skills to develop plans effectively. (4) The delayed process of specifying indicators could cause mismatching goals of the project

development. (5) The development of the potential of the director in charge showed that the person who was responsible for the self-development project could take on the project more. The fund committee could consider the project in some places, while the Directors of the Treasury Division were in charge as an assistant secretary to make clearer understanding and a more flexible process. There was also a program to monitor the progress of the project (National Health Security Office (NHSO) Fund program.)

2.2) Phase 2: The development of the potential of the fund by the project mentoring team at the district level. The team of mentors in the area was established to clarify the project, draft health plans and projects, and use an online data logging program detailed as described below: (1) A platform was held to clarify the objectives and importance of the project, to recommended online logging programs, to analyze and select issues of interest, and to create health plans and projects. The target group consisted of the Provincial Public health, and District Public Health. The Provincial Health Office of the Provincial Health Fund was responsible for the fund and target groups, project proponents, and project operators of the sub-district Health Fund (Representatives from the community group and the district quality of life development committee). (2)The workshop on "Making health plans and projects, and using online data recording programs for sub-district health situation analysis" was organized to develop health fund projects, and to practice using online data recording programs. The target group consisted of Provincial Public health, District Public Health, fund responsible persons, and the target groups of the district Tambon Health Fund. According to the fund for potential development, the fund's committees were the ones who were responsible for the projects. The committee members had the knowledge and understanding along with the program to monitor the progress of the project encouraging the process of duty monitoring but the potential of the people was different. The role of emphasizing the driving process of work was the officers' responsibility. The processes of project development still could not respond to the local problems. In some areas, the same projects were conducted in a short period for developing plans which the development of the fund potential helped improve an understanding of working guidelines for local administrators. In case of the importance of work, it was driving the process to move forward conveniently, to analyze the health situation at the district level, and develop work and practice using online data recording tools. (3) To cooperate with the district quality of life development committee in the area, there was a platform for clarifying the goals and importance of the project to the board to search for how to work together for each district quality of life development committee, through asking for cooperation and monitoring the working strategy. (4) To support the activities in the area, the monitor and support for working in the area were created. The district mentoring team focused on monitoring and recording the online data recording program. The mentoring team emphasized monitoring the implementation of the health activities of the sub-district health fund by using the fund's normal monitoring process.

3) To summarize the work and to continue working with the district quality of life development committee, this section has not been operated since the project of each health fund was still underway for planning the activities to organize a forum with the coordination of the district quality of life

development committee supported by the health fund to complete the project as specified in the plan.

4.2.3 Output

1) The Tambon Health Funds had the appropriate plan for solving problems through the use of the online logging program data https://local fund. Happy network.org /project/planning (retrieved on 31 Aug 20). The results revealed that PAD Dan Sai had 3 main plans from 36 one's recording the online information as follows: Alcoholic, Health Fund, and Food and Nutrition Program. 2 physical activities programs did not cover the Tambon Health Fund since each district focused on problem analysis. The actual situation according to the area context and the details regarding the number of work plans were shown in this table below:

Table 2: Summary of the number of online work plans (retrieved on 31st August 2020).

Plan	*Number of plans*
Liquor	*1*
Cigarettes	*3*
Drugs	*5*
Food and nutrition	*4*
Physical activities	*2*
Tambon Health Fund administration	*5*
Protection, solution, and renewal during Covid-19	*3*
Chronic disease	*3*
Health care for mothers and babies	*2*
Children, youths, and family	*1*
Old people	*3*
Environment	*2*
Preparation for disaster and diseases	*1*
Group of people with risk	*1*
Total	*36*

Regarding the results, it was found that the district quality of life development committee developed the plan for public health statistics (Epidemic disease in the area, dengue, COVID 19) of community villagers of 10 sub-districts to reflect the problems for being synthesized by selecting 10 issues that are problematic in every area into the district level. Community established the constitution for preparing information at village level took 1-year. There were also various government agencies jointly involved in this project by presenting the information from the datasets collected, in terms of public health, and disease and food safety for the local community.

The advantages of using an online program to record data plans were as follows: (1) Make the project plan effective and clear for the situation and the problem. (2) Be able to analyze the problem immediately. (3) Create the reliability of information and provide the data for all regions that help other sectors utilize immediately.

The disadvantages of using an online program to record data plans were as

follows: (1) The actual problem was not known since some of the data were only estimated. (2) The program could not utilize the situation information during the project development stage. (3) There was no complete information since all plans could not cover all situations. The problems were not consistent with democracy at present (Southern Region Reference).

2) Tambon Health Fund Project with Quality was from the online logging program data of https://local fund, happy network. org/ project/ planning (retrieved on 31, Aug 20) which found that Dansai district had 36 projects from recording online data with three main plans including Liquor Program, Cigarette Program, and Food and Nutrition Program. Although there were 28 physical activity programs reported, there was approximately 50-70 percent of data received as shown in the summary table below:

Table 3: The number of Online Programs Work Plan of Dansai Quality of Life Development Committee (Information on date31st August 2020).

Work plan	*The development projects*
Liquor	*1*
Cigarettes	*3*
Drugs	*5*
Food and nutrition	*4*
Physical activities	*2*
Tambon Health Fund administration	*5*
Protection, solution, and renewal during Covid-19	*3*
Chronic disease	*3*
Health care for mothers and babies	*2*
Children, youths, and family	*1*
Old people	*3*
Environment	*2*
Preparation for disaster and diseases	*1*
Group of people with risk	*1*
Total	*36*

According to the results shown in the table, the target group was to clarify the fund committee, follow up before the project, and organize monthly meetings. Based on problem and project KPI, the cooperation of health distributed the work to all target groups and projects covering 70-100% of target groups of project approval. However, the budget cuts could affect the proposed projects.

Highlights of using an online program to record project information were as follows: (1) There were guidelines for operating projects that could be developed into activities in the area. (2) Easy and convenient to write projects. (3) Can print out and propose to directors and executives right away. (4) Can summarize the project reports: (4.1) There was data storage that could be searched and able to study the prominent areas as an example. (4.2) The set of activities in the program could not be

carried out according to the activity guidelines, and the limited budget and some information were not inconsistent. (4.3) For adding information, the user has to select the menu and press the + to start. For doing so, the user could save anything on the computer.

3) Tambon: The online fund tracking system (Online). District Health Fund was a program to monitor and report on the performance by the NHSO. There were some online irrelevant programs, in terms of monitoring. There was a redundancy with the NHSO program as an additional burden for workers.

4.2.4 Outcome

This project required the district quality of life development committee to integrate the plan on the issues of the health fund. The district-level projects were integrated into the program and the district quality of life development committee had a database at the sub-district, for the implemen- tation of the project in the area. The current situation was that there has not been an explicit link between the district quality of life development committee and the Health Fund. This meant that the district quality of life development committee was working with all problems in the district. Due to the problem, preparing activities related to the ones' restaurant, and promoting jobs with overall problems in the district based on the information mentioned earlier from the area and from various agencies using the health statute as a tool to collect the common issues and to be measured by various roles given to organization groups involving with having a budget as a solution of problems. The Health Fund focused on comprehensive solutions according to the National Health Security Office (NHSO) target group. However, there were issues, problems, and activities in which the National Health Security Office (NHSO) and the mutual fund had done as a waste management issue. Some local authorities produced safe food. Therefore, the guidelines and statistical plans were not connected clearly.

Regarding the area and fund, the main issue was to abstain from alcohol, tobacco, and drugs. However, people still did not know the responsibilities of each fund. For the district quality of life development committee, there were clearly defined plans and indicators, and signing an MOU with the head of government agencies who were the board of the committee. However, the fund could not establish this system. The indicators for making plans were not clear. The prime minister, the chairman of the fund, has not accepted the policy since there were no responsible persons to join the district quality of life development committee.

The integrated project helped create the acknowledgment between the district quality of life development committee and the fund committee. This made us see way to drive the integration together seriously, to organize a forum for building up understanding, to set the common goals, to analyze the problematic data in the, to set the common issues, and to clearly define ~~the~~ joint plan using the District Health institution tool which was talking with the operating staff of the fund. Meanwhile, the district mentor helped consider, screen, guide, control, monitor, and support.

The additional limitations of the observations from provincial mentors converted the Health Statute into local practice. The budget was not limited to the district health fund only. There were other agencies in the area that allocate budgets for

public services. Therefore, they were able to join the program.

4.2.5 Impact

The effects on the health of some projects were to change in elderly health behavior, construct a school for the old people through the Health Institution for every district, and establish work plans regarding ages, visions, missions, and goals of quality-of-life development. At the district, sub-district, municipality, and target area levels, courses were corresponding to the health of the target group such as the group of patients staying at home. The conditions and details were consistent with the problem and there were nurses at the community and sub-district levels.

V. CONCLUSIONS OF RESEARCH FINDING

The monitoring and evaluation were based on the Ottawa charter assessment approach including five principles which were: human potential development, how to improve health, systematic improvement, mechanism of work, productivity, and health enhancement and strengthening of communities. The result was to change behavior and connection with both individuals and organizations. Impacts from public policy implementation included the management and health leadership which could be explained as follows.

5.1 Results of evaluation through Health Impact Evaluation application:

5.1.1 Affective factors for success consisted of 1) 67 people had the roles and duties of implementing the policy to the provincial, district, and area levels, with 12 main goals. There was a consideration for selecting as a vision, mission, and cooperation in good management according to the integrated driving project to Memorandum of Understanding in 2019 including (1) waste management and the environment, (2) network of green spaces, and (3) increasing people miss out on equal opportunities. Regarding the development of the potential of network people as a result of having a plan to spend money, some projects spent money for reviewing results and sharing knowledge resulting from the continuous work, 2) The environment was conducive to the valley and many people burnt the high ground, learned to adapt and survive in a suitable lifestyle by creating a network of green areas, and stopped using chemicals in growing vegetables. There was a service center for green plant production with a prototype area at the district, sub-districts, and villages levels for the district quality of life development committee and municipalities to participate, 3) Strong local communities supported the work plan, projects at the district, sub-district and area level, and both, private and public sectors signed Memorandum of Understanding (MOU) 2019 in which district, sub-district, municipality, and village levels funds were realized on the action, monitor, improve, develop, 4) There were a mechanism, system, and process of the project could be observed from the assessment of problems and needs. There was also a structure to appoint the district quality of life development committee for the sub-district level who encouraged every PAD/municipality and target model villages to run the activities of the project such as the Elderly School Project of community level, and the Dan Sai people fund project focusing on not abandoning those who missed the social opportunities. It was considered that there was integrated management regarding the recommendations including screening, scoping, techniques, methodology, and appropriate community needs, and 5) working to

implement the public policy to the local community with participation management which was adapted regarding the proper lifestyle. There was an examination of the Health Promotion fund program and driving the practice emphasizing on practical action, the improvement of the quality of life, and the interdependence area namely waste management and environment. Dan Sai, Green Net, and Dan Sai people were not abandoned from implementing innovative learning into practice, which was good management in Sukjai Sukha District leading to knowledge management in the SAO, and municipal health area and a model village of well-being.

According to the follow-up evaluation, the Ottawa Crater is a form of social capital for improving the quality of life that can enhance promoting effective health.

5.1.2 Health systems process and operating mechanisms were established with an emphasis on leadership that learns from roles, learns together, and raises the level of compliance with the memorandum of cooperation following the community health situation. The 3 goals were: 1) waste management and the environment with 4 indicators, 2) Green Net Dan Sai with 6 indicators, and 3) Dansai people did not abandon each other with 5 indicators, related to the partner of cooperation for realizing the real health leadership for Dan Sai people, and the improvement of the quality of life. The participants were the 3 sheriffs, and 3 secretaries of the Provincial Health Department, the deputy district chief, and the chief of the district agriculture department. The satisfaction of work was emphasized on the movement of the workers according to their positions, but the work performed was considered as an integration offered to the people who received the service of both waste management and the environment. The Green Net and Dan Sai were not abandoned, focusing on those who missed the opportunity.

3) Productivity encouraged community organizations to have an online project (Online) for Dansai District in Dansai Subdistrict Fund. Community organization groups 15 project plans of 36 projects in the fiscal year 2020 which could be classified into 3 main groups including 1) waste management and the environment from a household, of which 80% of waste management has been promoted to the community. There was one model village per sub-district and there were 10 clean villages, 2) promoting safe vegetable cultivation which was the coordination with the Dansai District Agriculture to promote safe agricultural villages with 3 safe vegetable markets including (2) Dan Sai district office, (3) GO minimart, 6 health product checkpoints, and markets, and 3) Dan Sai people did not leave each other behind. There were 29 trained nurses in every sub-district and four out of 10 districts who were appointed for working with the elderly club. Moreover, there was a fund for the care of the Dan Sai people by raising funds from the Dan Sai District. It started with the concept of providing caretakers for people who needed assistance but were unable to receive public services. Hence, a certain amount of money has been obtained from the donations and developed from various activities with a balance of 108,337.42 baht to increase opportunities for those who missed health opportunities to have a better quality of life.

5.1.3 The result was changed in behavior and working at both individual and organizational levels with analytical thinking by bringing the roles and duties of

the district quality of life development committee, village, and municipality to the mindset for driving mechanism including 1) filtering policy proposals, project, team and fund services of the district quality of life development committee/responsible persons, mentor division, and district/province coordinator, 2) determining the scope and guidelines for public scoping of the fund program integration in district quality of life development committee, the person responsible for the fund and mentor, and district and province coordinator. There were processes for both district and provincial quality of life development committee, and Municipality focusing on learning exchange meetings which were organized once in 2 months and having external organizations to study people, the network of satisfied people, and maintain the strength that can manage themselves and self-reliance leading to driving public policy in 3 visions including 1) waste management and the environment by reducing waste, less use of food packaging, 2) Green Net Network by consuming organic vegetables without using pesticides, having income from growing vegetables, living in normal life, and protecting in the field of health products, and 3) Leaving no one behind the program which the people were provided cares at home by nurses. Elderly people received health promotion reducing their dependence on home and bed addiction through elderly school management innovation. There was also a fund to care for Dan Sai people who could use the money to look after "Dan Sai people without abandoning each other". This was the result of effective management of quality of life in terms of good health through innovative learning by following 15 indicators of the MOU of the district and provincial quality of life development committee and Municipality, in which the model village was assessed at a good level.

5.1.4 The impact of the project implementation was assessed according to the Memorandum of Understanding on December 3, 2019, until September 30, 2020, with integrated and suitable quality of life development management by adopting a policy Social measure. The system caused an operational change in individuals and organizations and even community groups. There was an expansion from the district or the model village of health to offer more knowledge and innovative activities, namely: 1) waste management and environment, proper waste management at the household level, and reduce the use of foam in food packaging. There was a model village in waste management, and a clean village, 2) Dan Sai Green Net (Green Net) was created. There was a network to promote safe vegetable cultivation in every district, creating a market for farmers, and consumer protection of public health products at the district level, at least 4 points and there are 6 health product inspection sites, and 3) Dan Sai did not abandon each other and the future was extended to cover more aspects which were: 1) building up community care workers. There were nurses in every district to take care of the disabled who were 29 elderly people needing care in every district by using the budget at the area level of the SAO, 2) organizing elderly health schools in all 10 districts which could be considered difficult in some areas in the grouping. It was considered the learning of adults (Adult Learning) leading to health leadership and learning to change (Transformative Learning) to assure 18% of the elderly in 2030 of the country in the future of Dan Sai people to live happily.

5.2 Guidelines

There was the effective management and health leadership of Sukjai District emphasizing on learning through the practice of developing the quality of life at the area in Dan Sai, Loei Province since 2016 as follows: (Illustration).

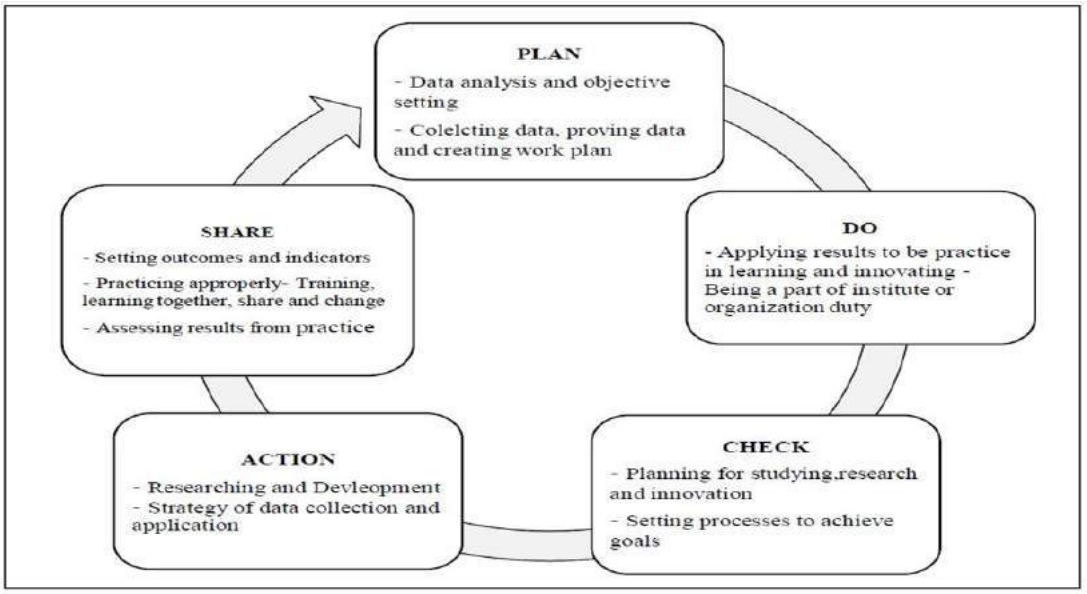

Figure 2: Effective Management and Health Leadership Model

VI. DISCUSSION

6.1 The development of human potential. There was the development of the potential of individuals in the group of mentoring teams at the district level and local mentoring team. The main areas of potential development included an analysis of the health situation in the area and developing programs Practice using online data recording programs. As a result, they had the skills and the importance of analyzing the situation and problems in the area which could be used to find a way for enhancing health through the district health fund. This may be because the local leaders who operated the project played a leading role in driving project proposals in the Tambon Health Security Fund. Local government organizations supported budgets and human resources in various projects as a network leader in various activities and in the area of the Quality-of-Life Development Committee at the area of Dan Sai District, Loei Province aiming at establishing the cooperative work (Prayoon Aranrut. 2018: 122-125)

However, the development of human potential did not cover individuals or groups such as the Tambon Health Fund Committee and the group of responsible persons. It was found that this online program was quite complicated to use. Therefore, it should be started with a group of people who will be able to practice and use it first. It was expected that when this group was skillful, they would expand the knowledge to

different people and groups in the community.

6.2 For the systematic improvements or mechanisms of work, it was found that a system to help support the preparation of plans in the strength of the online program was to cause analysis of problem situations with guidelines Clear health guidelines that can be adapted. More programs systematically linked issues. The original database was stored to build on new information. They could learn from other areas around the country and also encourage people to be aware of the size of the problem. They were very important and able to track work through the online system. This may be because the sheriff of Dan Sai focused on establishing a strategy for working, improving the quality of life by integrating collaboration with all parties, including the public sector, the private sector, the public sector, according to the Memorandum of Understanding (MOU) in enhancing the level of collaboration, and working hard for their localities, both matters of the elderly and the disadvantaged Children's stories and youth, including the reduction of the number of alcohol drinkers in the area (Prayoon Aranrut.2018: 127).

However, this online program was a duplicate of the performance reporting program of the National Health Security Office (NHSO), most of them reflecting the workload to the area as well. Moreover, the program is difficult to use and complicated. People who attended the program reflected that they did not understand or have much knowledge regarding the use of this program.

6.3) The development of public policy found a health database that could be integrated with other agencies in driving health and quality of life policy. There was one additional remark from provincial mentors who were the people designing the programs focusing only on the capital. The program should be designed to reflect the roles of agencies in driving the project with the District Counselor at the district level, Dan Sai District Public Health (Chamnan Meesuk 2018).

6.4), Public administration of the application for online projects (Online) from the health insurance fund at the district level in the preparation of a project to solve problems at the district level, with the rapid and effective implementation, and having effective management in planning (Plan), practice (Do), audit (Check), improvement (Action) and Share(Share). However, the promotion of public health encouraged the development of the quality of life of Dan Sai people to a certain extent of the public policy due to people's needs including 1) waste management and environment, 2) safe plantation network, and 3) Dan Sai people do not abandon each other who miss the opportunity of health and society (Chamnan Meesuk. 2020: interview).

6.5) Strengthening the community. The strengthening process of the community did not establish with the development of plans using the data of the fiscal year 2020. It focused on training to use the program. not covering the people who were committed to digital learning. As a result, there was a learning transition to have a sustainable education for schools, seniors' schools throughout E-Learning, and learning to transform health leadership to cover every district and recorded after practice (Commercial Criticism 2015: 178-197, 264-267).

6.6) Social environment adjustment. The concrete appearance of adjusting to the social environment of waste management and the environment was not very clear. It lacked coordination in the community due to the different community conditions in each area of Dan Sai District. The expansion of the area into 10 villages still lacked a systematic collaboration, which was a burden for the agricultural sector to expand work and the creation of a nurse does not have a clear direction, and the wages of nursing staff are not suitable, resulting to find replacement workers, and the care budget is still unable to provide as expected. This may be because there was a driving force of the local government organization, subdistrict Administra- tive Organization, and Municipality levels. However, there were some nurses at the minor district level. In addition, there was compensation for the responsible person according to their roles and duties that were not suitable for the local context and conditions (Sumalee Chantasorn. 2020: 2-3).

The social measures for the control of the consumption and distribution of rolled tobacco by Participatory Action Research (PAR), was established by studying related research literature and knowledge by the 68 co-researchers. The participants discussed and were interviewed in a focus group discussion. This led to the identification and construction of issues and activities that would later be used to develop effective social measures. Improvements were made to the participatory activities to include the publication of a handbook so that the co-researchers would have a common understanding of the activities through action learning. The evaluation of the experts found that the average value of overall efficiency, the Propriety, was at "The Highest" level. The Feasibility was at "The Highest" level. The Utility aspect was at "The Highest" level because the researchers designed the conceptual framework with the emphasis on action learning. The propriety of the factors and indicators reviewed by academic experts was at "The Highest" level. There results observed were used in the planning and construction of the necessary drive mechanism to implement effective social measures, the development of public awareness of the dangers and risks from smoking tobacco and the manufacturing of rolled tobacco, promote well-being programs and consultation services to the public to encourage individuals to quit their smoking habit by using case studies and role models, and enforcement of social measures. These measures include limiting smoking areas and regulating village shops and resellers to strictly abide by the decisions of the community, encourage rolled tobacco producers to work with the research team, and monitor and supervision by the sub-district administrative organizations in creating a healthy community (Chalard Chantarasombat and Pha Agsonsua. 2021: 239)

6.7) There was the effective management and health leadership of Sukjai District emphasizing on learning through the practice of developing the quality of life at the area in Dan Sai, Loei Province and there was a support mechanism for learning and participating processes as the knowledge and understanding to obtain skills of administration and management of health at district level comprising 5 processes: Plan, Do, Check, Action and Share. There at Indicators to indicate the success of the objectives on the community's health condition or the successful development of the project is divided into 6-7 main issues or dimensions selected by the participants of the research which are (1) Physical Health, (2)

Psychological Health, (3) Social Health, (4) Intellectual Health, (5) Leadership, (6) Community Organization and Network, (8) Environment, (9) Relationships, (10) Education, (11) Sufficient economy (Chalard Chantarasombat (2011: 628-629, 2011: 635-642). Consistent with a study integrated enhancement of health program and development of health mechanism at area level project by Chalard Chantarasombat, Somsak Seedagurit, Pongthep Sutheravut, Pairote Boriboon, and Rachaneekorn Inlek (2021: 55-61) was Integrated Enhancement of Health Program and Development of Health Mechanism at Area Level Project was an integrated project of the organizations under the Ministry of Public Health, Thailand, with one of its objectives to increase local participation in solving their districts health problems in their communities area. The procedures, methods, and mechanisms were set as a tailored program to all Area Healths in the country. This article studied the success levels of the project in 4 Areas Health in the Northeastern regions. We found different levels of success in each Area Health. The success factors on well-balanced participation roles between the state and the villagers' participants were a dominant one. Though the usefulness of the project caused the operational change in individuals, organizations, and even community groups, feedback from the local participants on the project should be carefully considered by the state to improve and revise the state project to create sustainable partnerships for health promotion achievements in rural communities.

VII. RECOMMENDATION

7.1) Processes of project development for the fund with effectiveness:(1) There should be an increasing role of the district mentors and each club group with a representative to coordinate with the district team. (2) There should be a search for group leaders with enthusiastic interest to develop potential plans and projects and analyze the problem of metric activity with their participation. (3) There should be the development of teachers of project processes in the public service units, writing project plans, and project management. (4) There should be the mobilization of community health problems, clarifying scope, and clarifying budget funding according to the fund announcement. (5) The exchange forum to develop project plans should be provided. (6) There should be the enhancement of understanding of financial spending and allocation for the local authorities

7.2) There should be the training for the committee's potential development: (1) There should be the training, workshop/follow-up on the upward movement, conducted as an assessment section in every quarter. (2) There should be the development of groups in the public sector who seek stronger funds to receive a scholarship to be capable of writing projects and managing projects as well as spending budget properly and reporting the result. (3) There should be a participatory follow-up evaluation (online and offline program) by (3.1) Integrating this program with the National Health Security Office (NHSO). (3.2) Reducing redundancy conveniently to use at all levels, allow the general public to use the program. (3.3) Selecting the pilot area to develop people to propose a project and to record information. (4) There should be the integration of Health Promoting Enhancement between the district quality of life development committee and the sub-district Health Fund: (4.1) Using data from the health fund recorded in the online program as the base for a common solution

to problems. (4.2) Signing the Memorandum of Understanding (MOU) for the development of quality of life at Dan Sai area for creating the important activities which should be systematic in each step of activity with coordination to move the project forward by the district agriculture, blood residue screening activity by health fund, and organic vegetables growing activity by the vegetable growing group and health fund, etc,...

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ABSTRACT

Many academics often apply knowledge creation for enriching the efficiency and quality of learning achievements. However, can knowledge creation also be used in low- technology situations such as school-based supervision of students? This paper describes the development and application of the learning module Educational Policy and Strategic Plan Development of Students (ED341306) at Northeastern University, Khon Kean, during the academic year 2020. The results were: 1) The efficiency of the action process in the learning module was 84.76, while the efficiency of knowledge was 83.26, which is higher than the specified criterion of 80/80; 2) the quality of the learning module, in relation to propriety, congruence, feasibility, and utility aspects was at "The Highest" level. 3) the effectiveness index of students was 0.7679; 4) the post-test learning achievement was significantly higher than the pre-test at .01; 5) significant differences occurred between the post-test and the pre-test, indicating that learning retention had been achieved; 6) students' satisfaction with the learning module was at "The Highest" mean level at.4.92.

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Many academics often apply knowledge creation for enriching the efficiency and quality of learning achievements. However, can knowledge creation also be used in low- technology situations such as school-based supervision of students? This paper describes the development and application of the learning module Educational Policy and Strategic Plan Development of Students (ED341306) at Northeastern University, Khon Kean, during the academic year 2020. The results were: 1) The efficiency of the action process in the learning module was 84.76, while the efficiency of knowledge was 83.26, which is higher than the specified criterion of 80/80; 2) the quality of the learning module, in relation to propriety, congruence, feasibility, and utility aspects was at "The Highest" level. 3) the effectiveness index of students was 0.7679; 4) the post-test learning achievement was significantly higher than the pre-test at .01; 5) significant differences occurred between the post-test and the pre-test, indicating that learning retention had been achieved; 6) students' satisfaction with the learning module was at "The Highest" mean level at.4.92.

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I. INTRODUCTION

Changing demographics is challenging the ability of master's degree program students in educational administration at Northeastern University, Thailand. The sustainability and viability of transferring knowledge to the next generation through traditional methods are circumvented by the trend of students relocating to more urbanized areas of Thailand. Rapid economic, environmental, and social development have impacted every country, and unskilled or low-skilled labor is more likely than ever to be eventually replaced by robotics and technology. Every country is determined to raise production levels with competent and specialized skilled human resources. These demands can be achieved through education and educational management. In response to the changing trend, the educational management of Thailand is focused on allowing students to acquire the necessary 21st-century knowledge and skills for their daily life and career advancement, and for contributing to the development of the Thai economy and society. The educational management should be aligned with Thailand's education policies, which include the following:

- The 20-year national strategy (2018-2037), which is the third strategy in the development and enhancement of human resources. The major development goals are to develop every

dimension of human resources' skill at all age levels. Human resources and students for the 21st century are to be virtuous, intelligent, quality individuals with public awareness and responsibility to society and others. They should be economical, generous, disciplined, ethical, and respectable citizens. They must have decent English and foreign language skills, be learning-oriented, and pursue self-development.

- The 12th Issue of the National Economic and Social Development Plan emphasizes that Thais of all ages are to be skillful, competent, and self-developed citizens. The development of educational management is supported by the Sufficiency Economy Philosophy. This philosophy addresses the global changes in the 21st century, which indicate students must possess the skills of 3Rs8Cs, namely reading, writing, and arithmetic (3Rs), and. analytical thinking, critical thinking, problem solving, creativity, innovation, understanding cultural differences, cross-cultural appreciation, collaborating, teaming, and leadership. They should also possess ethics, mercy, discipline, and compassion (Institutions of Community Colleges, 2018).

The teachers' role must meet the current context of global society as well as adapt to the changed students' requirements, which include external factors such as social-cultural trends, information, communication, and technology. These needed developments are supported by the 3rd Issue of Thailand's National Education Act, Category 4, Section 24 (5) of the Educational Management Guidelines, which states:

Learning management, the schools, and related working units should enhance and support the teachers to be able to provide the climate, environment, learning media, and facilities for the students' education. The students and teachers must be knowledgeable and able to use research as a part of the learning process. (Chantarasombat, 2020)

Section 30 specifies that the schools should develop efficient instructional processes and enable the teacher's ability to research, so developing appropriate learning processes with students at each educational level. Teachers are the most important resource in educational quality development and are tasked with providing and developing education so that students obtain knowledge and competency with complete potentiality. Teachers must apply various techniques that are essential to change or develop new concepts in instructional management to meet contemporary times appropriately (Dechakupt, 2011). The teacher's role is shifting from just giving lectures in front of classes to becoming more of a facilitator or a coach who provides suggestions, recommendations, and assistance when needed. In this regard, Panich (2013) asserted that teachers have to change their role of lecturers, and become more coaches and initiators. In order to create a sustainable learning management network, teachers and students should systematically and continuously share their learning experiences, and create a professional learning community (PLC). The learning module or module lesson is a collection of educational innovation and technology that can be utilized for revising and improving the different courses or educational processes. This can be achieved step by step and by investigating the efficiency of the module carefully (Sigkabundit & Sigkabundit, 2011). According to Lawrence (1973), the learning module is a systematic instructional process including various teaching methods used for self-studying, based on individual differences. Learning modules can help students keep pace with their education and reveal the student's level of competency or progress in each stage. The learning module is an instructional innovation with a collection of learning content that can enhance students' learning potential.

The authors agreed with instructors at Northeastern University and collaborated with instructors in the master's degree program of educational administration during the first semester of 2020. They constructed one major pilot course for studying the appropriate innovation in the form of the learning module *Educational Policy and Strategic Plan Development for Students (ED41306)*. The

module was focused on learning through practice, action learning, creative thinking, innovative development, expert competence, creation of new knowledge, and the ability to transfer that knowledge by coaching and instructing others. The goal of the module was to be an efficient and effective criterion that can be extended to interested individuals and groups, and benefit higher educational institutions in the future.

II. BACKGROUND

These results are also supported by Donbund (2018). who found the overall posttest learning performance was significantly higher than the pretest ($p < .01$). Moreover, the mean value of learning score in each aspect, including the learning achievement, scientific process skill, and critical thinking ability after trying out the module, was significantly higher than the cutting point at .01 level.

In first semester 1, 2020, we had started the learning module for doctoral students in Educational Administration and Leadership at Northeastern University, Khon Kaen, Thailand, by studying elements and factors including the current and desirable condition of Thai learning management in enhancing the critical The authors' study in "The Development of Innovation for Improving the Learning Achievement of Schools, under the jurisdiction of Nakon Panom Primary Educational Service Area Office 2" (Chantarasombat, Udom Boone Anupap, & Songsri, 2018), by applying the approach/theory of supervision, the Route to Excellence and Coaching and four learning modules. The project participants included teachers, school supervisors, and administrators. The mean value of efficiency was 90.69/81.02, which was higher than the specified criterion of 80/80. The mean value of post-test efficiency was significantly higher than the pretest at .01 level. The effectiveness index of development was 0.7480. This indicated that the trainees obtained 74.80% of additional knowledge. As a result, the learning community was developed in both classroom and school levels. Teamwork, cooperative participation, and a learning network were successfully achieved through action learning. Teachers were confident, group relationships were developed, and the participants supported each. The overall mean value of satisfaction on the improvement of teachers, school administrators, and supervisors was 4.60. The satisfaction of the learning module was at "The Highest" level. The findings were consistent with Charoenpong's (2012) work. This author's research findings showed that the post-test scores after learning through the learning module *Engineering Mechanics for High Vocational Certificate Qualification* were significantly higher than the pretest at .05 level. The highest level of students' satisfaction was in the enhancement of creative thinking. thinking of the secondary school teachers before creating the program by using google classroom technique for critical Comparative analysis of Thai education management Global and regional society (Chantarasombat & Sombatsakulkit, 2021), Sirisuthi & Chantarasombat, 2021), and Chantarasombat, Sombatsakulkit & Chaikirin (2021). We used 3 experts and 2 pre-test groups who were not our research population to evaluate our module. Their feedback had been used to develop the module for improving learning and teaching focusing on participating between teachers, administrators, and academic persons before offering the module to the doctoral students. Therefore, the researcher is interested in developing a module for lifelong learning and 24 hours a day for students in course 41306 by applying the Google Classroom software package because it wants learners to learn with real practice, according to the jointly planned program. There is learning with both learners, teachers, learning resources, and research in the classroom as well. In order to summarize the lesson and extend the results at the graduate level.

III. RESEARCH QUESTIONS

The authors determined the following research questions to design, construct, and develop the learning module:

- Would the efficiency of the learning module *Educational Policy and Strategic Plan Development for Students*, meet the specified

criterion 80/80 and how would it meet or surpass that target?
- What level of propriety, feasibility, congruency, and utilities would follow after the evaluation by scholars and experts?
- What value would the effectiveness index in the learning management for the students be?
- Would the learning achievement of students' posttest scores be higher than the learning achievement of their pretest scores and how can the post-test scores be higher?
- What would the students' learning retention be?
- What level of satisfaction would the students have and how to achieve a "High Level" or "Highest Level"?

IV. RESEARCH OBJECTIVES

In this study, the authors aimed to:

- Construct and develop the learning module for lifelong learning and 24 hours a day for students in course 41306 by applying the Google Classroom software package by using 80/80 standard efficiency criteria.
- Evaluate the quality of the learning module by scholars' and experts' review.
- Search for the effectiveness index of students. Compare the pre-test and post-test scores in students' learning achievement.
- Analyze students' learning retention.
- Analyze students' satisfaction.

V. RESEARCH DELIMITATION

The population of this study consisted of 14 selected and 12 volunteer Doctor's Degree students in educational administration and Leadership of Northeastern University during the second semester of the 2020 academic year. The participants were continuously engaged in the program *Educational Policy and Strategic Plan Development (ED41306).*

The independent variable was the learning management of the learning module. The dependent variables included learning achievement and satisfaction.

The authors conducted the study during the secondary semester of the 2020 academic year. They divided the content material into learning units or submodules which included:

- Management and implementation.
- Planning defines the vision, mission, goal of the educational plan.
- Educational development planning into action.
- Practice planning participatory action.
- Creation and educational innovation.

VI. RESEARCH CONCEPTUAL FRAMEWORK

The authors determined the development of the learning module of *Educational Policy and Strategic Plan Development for* Students and the conceptual framework by experts' evaluations. The innovation of the learning module of *Educational Policy and Strategic Plan Development for Students*. As shown in figure 1.

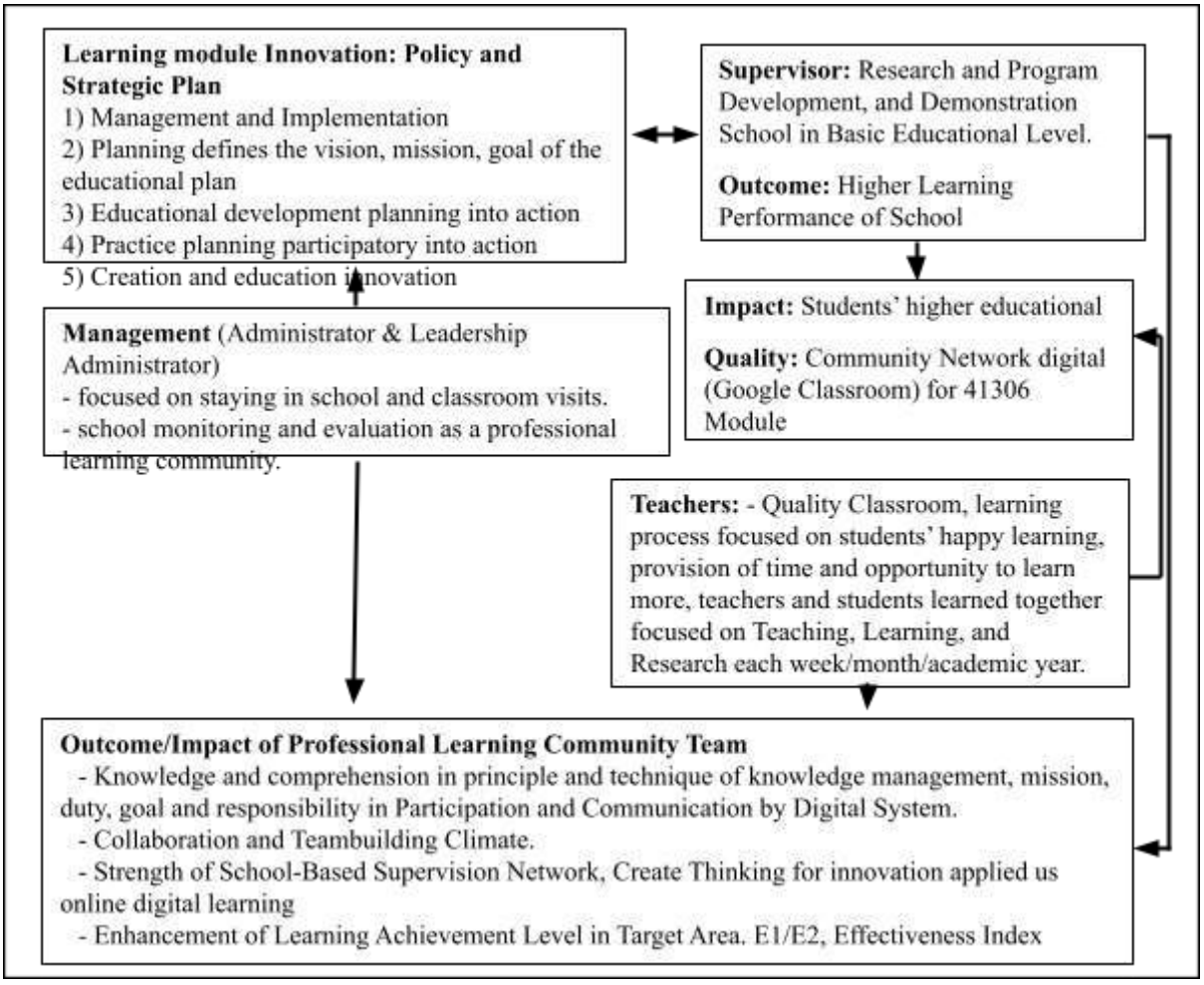

Figure 1: Conceptual Framework of the study of developing the program of leader students in learning management for enhancing modules of Educational Policy and Strategic Plan Development for Students.

VII. CONSTRUCTION AND DEVELOPMENT OF RESEARCH INSTRUMENTS

7.1 Learning Module Educational Policy and Strategic Plan Development for Students

The learning module *Educational Policy and Strategic Plan Development for Students* consisted of the following development steps and discoveries:

- The authors conducted the collaborative determination of issues in the development and planning of the learning module at the Faculty of Education, Educational Administration, Northeastern University, Khon Kaen Province.
- The researchers analyzed the documents of subjects related to Educational Policy, Strategy, and Technique for determining the appropriate content and innovative techniques in enhancing the level of learning performance. They also surveyed the cases of best practices by studying: The theoretical approaches in educational quality during the 21st century, the leaders' development by supervising and coaching, the construction and development of PLC, the Educational Supervision Clinique the Route to Excellence (Deanery, 2016), Chantarasombat and

Udomboonyanupap's (2016) approach/theory of supervision for excellence., Peter Kadley's 2013, as cited in Chantarasombat et al., open classroom, the field trip study for the construction of a PLC focused on Open Classroom and Application of Student-Centered learning of Rayong Primary Educational Service Area Office 2 (Poompuang, 2019), and the implementation performance of mathematics in primary education of Ban Kam Bong School 1, Mukdahan primary educational service area (Chaimayo 2016).

- The authors divided the construction and development of the learning module *Educational Policy and Strategic Plan Development for Students* into five sub modules: Supervision Planning, Technique for Higher-Order of Supervision, Educational Quality Assurance, Enhancement of Student Support System, and Development of Supervision Network.
- They presented all of the five learning submodules to five experts for the evaluation of the propriety and congruency of the content. The five experts included: Professor Dr. Preecha Pratepa, Associate Professor Dr. Boonchoom Srisa-ard and Associate Professor Dr. Siri Thearsana. The experts' found that all five learning sub-modules were at "The Highest" level with regards to propriety, feasibility, congruency, and utility.
- The authors tested all five learning submodules on nontarget groups, groups of 1-5 students, subgroups and individually on 9 students who were educational administrators and Doctor's degree students in educational administration. The efficiency of the tests was 83.47/82.59. The authors improved and revised the learning modules as a part of the handbook for participants. They published the five learning submodules and used them in the final test with the target group which included 16 Doctor's degree students in educational administration at Northeastern University.

VIII. CONSTRUCTION STEPS AND EXAMINATION OF THE QUALITY OF LEARNING ACHIEVEMENTS

The construction steps and examination of the quality of learning achievements were as follows:

- The authors studied the theoretical approaches and rationales for constructing the learning achievement test and applied Srisa-ard (2002) criterion referenced test as guideline for creating the learning achievement test.
- The learning achievement test included questionnaires with four multiple choice answers and 80 mandatory test items out of 100.
- The authors presented the learning achievement test to the experts to evaluate the congruence between the test and its behavioral objectives. The scoring criteria were as follows:
  a. +1 when the participant was confident that the measurement of the test was based on the behavioral objective.
  b. 0 when the participant was not confident that the measurement of the test was based on the behavioral objective.
  c. -1 when the tester was confident that the test did not provide the correct measurement, based on the behavioral objective.
- The authors analyzed the index congruence between the test items and its behavioral objectives using Pattiyatani's (1998) the item-objective congruence (IOC) formula. They completed this step by selecting the test with the IOC index ranging from 0.5 to 1.00 as the criterion of available content validity; then, they used this index to acquire the desired item numbers.
- They tested the tests with the IOC value with a non-target group. Test supervisors were 14 school administrators who were graduates in educational administration, teachers, and educational supervisors under the jurisdiction of Khon Kaen provincial education office who acted as coaching teams to the participants. The authors carried out the test at I Hotel,

Khon Kaen province, with a total of 60 participants. The goal of the test was to study the participants' reaction and response to the trial test, reaction time in completing the test, and comprehension of the presented questions.

- The researchers analyzed the obtained scores to search for item difficulty (P) and item discrimination in each test item. The analytic findings showed that the item difficulty ranged from 0.40 to 0.80, and the item discrimination ranged from 0.20 to 0.60. The authors determined the reliability of the total test (rtt) by the KR 20 formula, and obtained rtt = 0.84.

XI. STUDENTS' SATISFACTION

The construction steps and quality investigation of the 12-item questionnaire determine the satisfaction of the students and were as follows:

The researchers studied Soontrayut's (2008) theoretical approaches of satisfaction.

They used Boonchom Sri sa-ard's (2003) guidelines for basic research to study the techniques for designing the satisfaction questionnaire.

They based the 5-level rating scale on Likert's principle; they used the above-mentioned scale to determine the guidelines and rationale for constructing the satisfaction questionnaire.

They constructed the questionnaire based on its objective, according to the 5-level rating scale.

They presented the satisfaction questionnaire to the group of experts for the evaluation of the congruence between question items and the behavioral objectives. The scoring criteria are identical to the scoring criteria in the learning achievement test (see point 3 of the subsection *Construction Steps and Examination of the Quality of Learning Achievements* above).

The researchers tested the questionnaire on the same non-target group as in point 5 of the subsection *Construction Steps and Examination of the Quality of Learning Achievements* above. The item discrimination (rxy) ranged from 0.32 to 0.83. They determined the total issue reliability of the questionnaire by the Cronbach's alpha coefficient (-Coefficient), which calculated the total issue reliability of the questionnaire was = 0.93. Then, they printed and used the satisfaction questionnaire as a research tool to collect data.

X. DATA COLLECTION

The authors acquired theoretical knowledge by pre-test and post-test learning scores from the learning achievement test. They collected the learning retention data after the pre-test and the post-test, which was performed two weeks after, and the satisfaction data by the satisfaction questionnaire.

XI. DATA ANALYSIS

- The efficiency and effectiveness of the learning module was analyzed by using the Mean and Percentage of Brahmawong (2013). The efficiency was searched for using E1/ E2 formula, as follows:

$$E_1 = \frac{\sum X / N}{A} X100 \quad (1)$$

$$E_2 = \frac{\sum F / N}{B} \times 100 \quad (2)$$

The effectiveness index of the learning module was analyzed by using the following E.I. formula Effectiveness Index (E.I.) = The sum of the post-test score The Sum of the pretest score.

(Student number X full score) - The Sum of the pretest score

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- The student's knowledge and learning retention data was collected by pre-test and post-test learning score from the learning achievement test while the learning retention had to be collected after the post-test which was performed 2 weeks later. Comparison of the learning achievement of the learning module was analyzed by mean values of t-test (dependent) comparative analysis between pre-test and post-test (Sri sa-ard,2010).
- The satisfaction on the learning module data was collected by using the satisfaction questionnaire. It was analyzed by using the mean value ($\overline{X}$) and standard deviation (SD) for measuring the satisfaction level.

XII. RESULTS

The Factors of Critical Thinking of the Secondary School Teachers Comprised of 10 Factors Teachers prepared various learning activities, 2) teachers presented motivated activities, 3) teachers offered learning activities in different places, 4) teachers offered learning activities emphasizing on child center, 5) teachers used technology in learning management, 6) teachers offered activities related to daily life, 7) teachers used innovation in learning activities, 8) the activities were cooperated with the community, 9) the activities were emphasized on teaching moral, and 10) the activities were assessed and evaluated. The study found that the current condition of learning management for enhancing critical thinking of the secondary school students was at moderate level. When considering each factor, the experts agreed with the teachers about preparing various learning activities and using technology in learning management. The desirable condition was at the highest level, too. As shown in Figure 2.

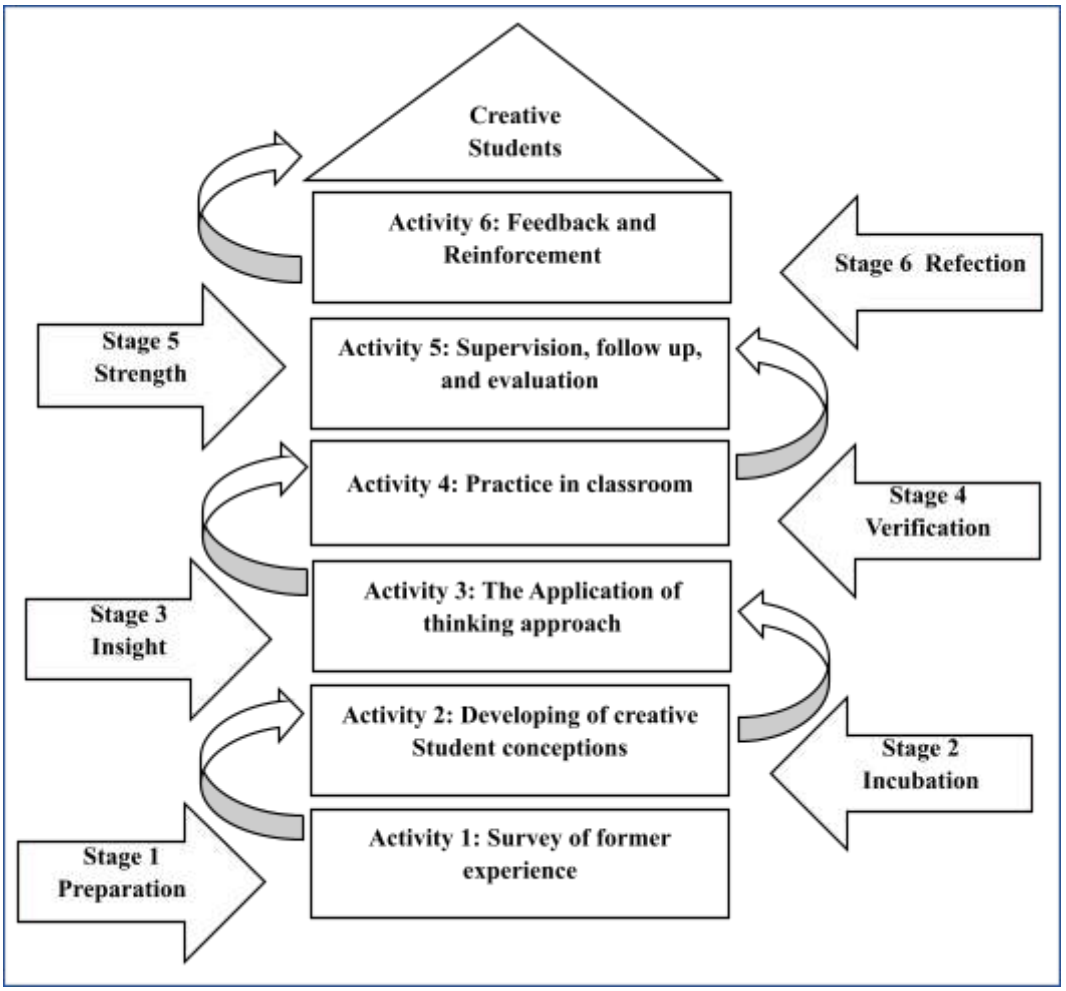

Figure 2: Creative Module of Teacher Leadership Program for Learning Management in Enhancing the Critical Thinking of: *Educational Policy and Strategic Plan Development* (ED41306) students.

The program in learning management for enhancing critical thinking of the secondary school students including: 1) the principal of the program, 2) the objectives of the program, 3) the goal of the program, 4) the content of the program development. The content included into 9 modules: 1) the survey of experiences, 2) the planning, 3) the concepts, 4) the applied concepts, 5) the classroom implementation, 6) the supervision, monitoring and evaluating of the study, 7) the feedback and reinforcement, 8) the seminar for strengthening, and 9) the presentation at the academic conference. The final parts of the module focused on doing activities outside the classroom. The researchers defined activities on learning by advising and helping continuously. The learners who participated must have plans, and review the principals from the beginning to face real practicing. It meant that there were advisors who gave advice, taught, and gave feedback continuously. This process could make the understanding. The treatment included training, and self-development which included 6 steps; 1) preparation, 2) training, 3) understanding thoroughly, 4) verifying and evaluating, 5) strengthening, and 6) giving feedback. The results from the experts' evaluation showed that the benefits, possibilities, correcting, and suitability at the highest level ($\bar{x}$ = 4.69, SD=0.42).

3.2 The Results from the Research about the Module Found Its Achievement as Follows

Table 1: Process Efficiency vs. Effectiveness of Results for Developing Knowledge Managers in Leader Teacher in Creative Thinking for Enhancement the Doctor

Number	Score after 2 weeks (60)	Pre-test (60)	Practical Score for program							Post-test (60)
			Survey/former (40)	Develop Creative (20)	Applying of Thinking (20)	Practice (20)	Supervision (20)	Feedback/seminar (40)	Total practical (160)	
1.	58	40	38	18	18	18	18	38	148	49
2.	58	38	38	18	18	18	18	39	152	56
3.	58	41	37	18	18	17	17	38	145	52
4.	53	39	37	18	17	18	18	38	146	54
5.	57	34	37	18	18	18	18	37	147	50
6.	58	30	37	18	18	18	18	38	149	50
7.	59	34	37	18	18	18	18	38	150	52
8	58	28	37	18	17	18	17	38	144	50
9.	60	28	37	18	17	17	18	38	144	51
10.	60	26	38	17	18	18	17	38	147	50
11.	58	27	38	18	18	18	17	38	149	48
12.	58	29	38	17	17	18	18	37	146	47
13.	58	52	37	18	18	18	18	38	149	50
14.	57	24	38	17	18	18	18	38	151	45

15.	60	42	38	17	17	18	18	38	146	49
16	60	45	38	18	18	18	18	38	149	55
Total	930	438	600	284	284	286	285	607	2,362	808
$\overline{X}$	58.13	27.38	37.50	17.75	17.75	17.88	17.81	34.94	147.63	50.50
S.D.	0.21	0.79	0.56	0.55	0.55	0.56	0.56	0.57	0.54	0.67
$\overline{X}$ %	96.88	68.45	92.95	88.75	88.75	89.40	89.05	94.85	91.88	84.17

From Table 1 It was found that the results of evaluating the efficiency of the process and the efficiency of the results of the development of learning resource leaders in planting wild mustard greens. The overall efficiency of the process on the efficiency of the results was 91.88/84.17which was higher than the criteria at 80/80.

The effectiveness index for the program was at 0.7679 which explained the resource leader's higher knowledge 76.79%.

Table 2: Comparison of Learning Achievement on Online Learning Program by Using Google Classroom, Subject: ED41306 (*Educational Policy and Strategic Plan Development*)

Test	Amounts of Students (Ph.D.)	($\overline{X}$) (Total 60 scores)	Standard Deviation (SD)	t	Sig
Pretest	16	27.38	0.79	9.3897	0.01*
Posttest	16	50.50	0.67		

Sig, 0.01= 2.518

From Table 2, found that after learning through the Online Learning Program by Using Google Classroom, Subject: ED41306 (Educational Policy and Strategic Plan Development) the posttest scores were higher of the significance score at 0.01.

Table 3: Comparison of Learning Achievement on Online Learning Program by Using Google Classroom, Subject: ED41201 (Critical Comparative Analysis of Thai Education Management)

Test	Amounts of Students (Ph.D.)	($\overline{X}$) (Total 60 Scores)	Standard Deviation (SD)	t	Sig
Test 1 (Having a posttest immediately)	16	50.50	0.67	7.8053	0.01*
Test 2 (Having a second posttest again after having the first posttest 2 weeks)	16	58.13	0.21		

Sig, 0.01= 2.518

From Table 3, the second posttest after learning through the Online Learning Program by Using Google Classroom, Subject: ED41306 (Educational Policy and Strategic Plan Development) was higher than the first posttest of the significance score at 0.01 which shown that

students had durability in learning and this tended to show that their learning will be developed.

And after consideration in each aspects the result of satisfactory for students to lecturer and support have indicator learning was: 1) contents 2) theory teaching skill 3) teaching skill of practical teachers 4) teacher characteristics 5) relationship between teachers and students 6) learning support 7) assessment and evaluation and 8) in summary, the teachers are efficient and effective in teaching and learning as table 4.

From the table 4, the results of the student satisfaction is in the quality of teaching and teachers and support Course 41201 Internal supervision in the first semester of the academic year 2564 found that the overall satisfaction of the students was at the highest level with an average of 4.92 and a standard deviation of 0.14 with consistent opinions and there are suggestions, strengths, innovation, learning, lessons, modules on internal supervision in the school, resulting in new knowledge to be applied in accordance with the local context results:

a. The program had the efficiency of the process for the learning outcome (E1 / E2) at 91.88/ 84.17 which was higher than the criteria at 80/80.
b. The effectiveness index for the program was at 0.7679 which explained that students gain higher knowledge 76.79%.
c. The students who were taught by the module gained their learning post-test score higher than their pre-test scores significantly at .01. After teaching, their learning retention data showed the students gained similar scores from the posttest and after 2 weeks of teaching. It was clear that students' learning retention scores by the module were stable.
d. The students' satisfaction from the module was at the highest level ($\bar{X}$ =4.92, SD=0.14). The highest level of mean values ranking in order from high to low are as follows:

- Lecturing and providing the learning activity management by lecturer and students.
- In the Higher-Order Educational Supervision Technique, the satisfaction was in "The Highest" level ($\bar{X}$ = 5.00, SD = 0.00).
- In the Enhancement for Student Support System, satisfaction was in "The Highest" level ($\bar{X}$ = 4.92, SD = 0.14).
- In the Construction of Supervision Network in Lecturing and Practicing, the satisfaction level was in "The Highest" level ($\bar{X}$ = 4.82, SD = 0.34).

XVI. DISCUSSION

The efficiency index (E1/E2) of the learning module *Educational Policy and Strategic Plan Development for Students* was 84.76/82.26 and above the specified criterion of 80/80. The following factors contributed the high scores and overall high satisfaction:

- The authors thoroughly studied the curriculum, related documents, and research literature in constructing the learning module, which they revised, corrected, and improved by the experts' recommendations. The research findings highlighted that the overall quality of the developed learning module, after the experts' evaluation, was at "The Highest" level. The quality of propriety, feasibility, congruency, and aspects, was also at the "The Highest" level.
- The authors tested the developed learning model with the sampling groups they had selected and also the group that had volunteered. The trial results showed that efficiency was 82.67/83.89. During the trial test, the authors personally collected the data from the participants and were present during the tests. The students' participation in the activities and observations were not perfect, but they were continuously improved upon to find the strengths and weaknesses during the trial period. The team of experts indicated that the content of the learning module included a variety of diverse activities that can create innovative knowledge and ignite creativity. The experts also noted that the learning module can be applied to other educational programs and curriculums. The

experts also pointed out the weakness in the construction, namely that the efficiency of the trial test would be muted or not as efficient because the participants lacked a handbook or reference guide of the learning module. As a result, the researchers created, published and made available a handbook to all participants before the test trials began, thus making the learning module complete. Trial tests with the sampling group were satisfactory and the authors carefully checked the learning module until they were confident that it was perfect and could meet the target's criterion.

The high efficiency index of the developed learning model is consistent with Inruengsri's (2011) findings. The research findings indicated that the learning module, including the rationale, reason, objective, basic knowledge, basic evaluation, learning activity, post-test evaluation, and remedial teaching, had an efficiency of 83.88/85.96. by Donpraipan (2013) achieved similar scores. The efficiency of the learning module in Sufficiency Economy Philosophy was 79.66/82.77 with a specified criterion 80/80. Krongdanern (2016) found that the learning module Sequence had an efficiency of 83.30/84.55, which was higher than the specified criterion. Hasakun (2016) established the training module for instructional management as a part of a handbook of a short-term training program management in IOP model application, and found that the suitability of programs was in "The Highest" level and "High" level. The congruency was in the "High" level in every aspect. The theoretical achievement was 81.60/80.49%. The achievement was 79.42%. The theoretical achievement was 82.32/81.41%. In practice, the achievement was 79.91%, which was higher than the criterion in both the theoretical and practical aspect. Papapasit (2018) found that the efficiency of the self-study Classroom Research was higher than the standard criterion 80 / 80, at 81.53/88.46. Rowland (1995) found that the developed learning module was efficient, and that the students obtained supplementary knowledge and discipline.

The authors applied the correct theoretical approach and practices, which resulted in a learning model that was appropriate for teachers to utilize for students' development. Indeed, the learning module is an effective educational innovation that can assist students in achieving their full potential. Chantarasombat (2020) found out that the efficiency of the self-study Classroom Research was higher than the standard criterion 80 / 80, at 84.67/83.00. Besides, Chantarasombat observed the effectiveness index management of students learning modules for students was 0.6577, indicating that the students had an increased knowledge for 65.77 %.

The students 'post-test learning achievement scores were significantly higher than the pre-test at .05 level, because the learning activity was an action learning process, as the activities focused on authenticity, real-world situations, and student-centered learning. It was necessary to provide the students with as many tangible practices as possible, so that they would have direct experience and properly exercise their skills. Practices and activities should be based on their satisfaction and divided into individual activities, group activities, and activities for the entire class. Student-centered learning activities provide students with more skill practices and are an important factor that increases the speed of self-learning in acquiring new knowledge and development of critical thinking processes. (Chantarasombat, 2018) Chantarasombat & Meekhamtong 2020, Chantarasombat & Sombatsakulkit (2021), Sirisuthi & Chantarasombat (2021), and Chantarasombat, Sombatsakulkit & Chaikirin (2021). This view is supported by Dechakupt 's (2011) assertion that the student-centered instructional management guidelines focused on the development of new knowledge and also innovative thinking through intellectual processes and teamwork. The students must interact and participate as well as learn how to become a teacher, and eventually be capable of applying the gained knowledge. Experts investigated the applied learning module and found that the efficiency was also at "The Highest" level. Students viewed that the activities were stimulating and the language of the questions was

easy to understand, which enabled them to answer more accurately. No significant differences occurred in post-test learning achievement scores and post-test learning achievement scores after two weeks, suggesting that the learning module had allowed to achieve learning retention.

The learning module motivated students because of their direct participation in the activities, as they gained new knowledge from elements and surroundings with which they were familiar. Awareness and relatable environments produce good conduct through simple techniques without excessively complicated activities. Each learning sub-module included activities in analytical thinking techniques and synthesis. Selecting simple, recognizable stimulates enthusiasm. When selecting an appropriate learning activity, a teacher has to ensure basic knowledge in the learning management principle and determine the learning objective in order to guide the students. Familiarity stimulates learning interests, entices better cooperation, and improves learning competency; also, the students can apply it in their daily life.

Consideration of the participants' differences and creating an enjoyable learning atmosphere simplified the learning activities and provided a welcoming instructional ambiance. Creating a pleasant learning atmosphere throughout the learning activities is consistent with Kaemmanee's (2013) findings that the effectiveness index of students' learning management through the learning module Educational Policy, Strategy, and Strategic Plan (EDA6201) was 0.6577 or 65.77% with Chantarasombat (2020). This author showed that 65.77% of the students could learn more and were content. A pleasant learning experience is the ideal instructional setting; thus, teachers and instructors should seek out various learning techniques and adopt them in the student's development. The important factors to contemplate include: The lessons must be useful and meaningful, the learning activities should be diverse, the learning media should be interesting, evaluation should be emphasized on each student's potential, and the interaction between the teachers and students should be friendly, compassionate, encouraging, and supportive of each other.

Knowledge, skill practice, and students' attitude should be key when conducting evaluations. Behavioral observation, performance scrutiny, examination, and evaluating findings should be performed and informed regularly to improve the efficiency of the activity. The learning media should be based on an informal instructional process with minimum complexity. Systematically utilizing the developed learning module yielded efficient learning achievements and a high effectiveness index. Samersak's (2005) research supported the same level of success based on the high vocational certificate program 2003 in the Electrical Power Course. The results concluded that the experimental group's learning achievement scores were significantly higher than those of the control group students at .01 level. Donbundit (2008) found that the overall post-test score was significantly higher than the pretest at .01. Krongtanern (2016) found that the post-test scores in learning achievement of students in the mathematics learning module Sequence were significantly higher than those in the pre-test at .01 level. Nelson (1994), who constructed the learning module for enhancing and encouraging patients being treated by nitroglycerin, found that their knowledge and morale were increased more than those of patients who only studied through documents at .001 level.

The students' overall satisfaction was in "The Highest" level, because the developed learning module was innovative and interesting, and had diverse learning activities that coincided with the students' competency. The learning activities challenged the students' interests. This is consistent with Koonchon Na Ayutthaya's (1993), Chantarasombat & Meekhamtong 2020, Chantarasombat & Sombatsakulkit (2021), Sirisuthi & Chantarasombat (2021). theoretical approach and principle in the construction of learning modules. This author recommended the following:

- Learning module constructors should regularly consider the general objective of the program and carefully examine whether the objective of

the lesson can develop students' competency as specified. The instructional activity management should be congruent with the instructional philosophy of the program.

- Teachers should define the competency to be learned by students.
- The designers should determine the level of basic competency for the students and should only be centered on the basic issue of the lesson. If possible, they should set the basic competency at the minimum level for flexibility.
- Basic evaluations should always be refined, so that the criterion could accurately measure the students' competency relating to the objective. The evaluation should be grounded in reality and provide feedback for students. The most efficient measurement technique should be taken into consideration and designers should participate in the diagnosis of the weak points.
- The designers should provide various alternatives to students, so that they could select what would be most helpful for them to succeed and be congruent with their learning styles. The learning experience should also help them to learn in a short period. The students should have an opportunity to select and construct their activities with their teachers' support.
- The teacher should prioritize the learning activities and inform the students, so that they are aware and understand each stage of the activities before commencement.
- The students' selected activities should provide equal opportunity for all participants to practice.
- The pre-test should be reliable and must accurately measure the student's achievements. Pre-test evaluations should follow the same guidelines for the basic evaluation.
- The designers should specify corrective learning activities appropriately. These activities should be dependent and specific, and must be applied after pretest evaluations. Corrective learning activities can also be included as a selective choice for students to participate.
- The description of the learning module should be precisely defined.
- The designers should allow as many co-workers and students as possible to comment on the learning module, so the constructed lessons and activities can be corrected and improved.
- The designers should always revise to see whether the completed lesson focused on the competency of student development and if the lesson is a good example of efficient education.
- Learning modules and activities must always be flexible and allowed to be modified and adapted to meet students' requirements and satisfaction. Charoenpong (2012), Chantarasombat & Rooyuenyong (2020) Chantarasombat & Meekhamtong 2020, Chantarasombat & Sombatsakulkit (2021), Sirisuthi & Chantarasombat (2021) successfully applied many of the suggestions of the advocated learning module.: This author found that the students' satisfaction was in "The Highest" level.

XV. RECOMMENDATIONS

15.1 Recommendations for Application and Development

The learning module *School-Based Supervision for Students* is an innovative and effective learning module, also because students must prepare themselves for continuous self-education. Students and teachers must collaborate to make adjustments and modifications to improve the lessons and activities (Chantarasombat & Sirisuthi, 2019). The learning module can be adjusted so that the schedule and duration are flexible, and can be hosted in diverse locations. Before-action review and after-action review will improve the learning module to have more meaning, if students and teachers choose to apply the learning module to self-improvement or group development programs. One of the weaknesses that the authors rectified during the construction of the learning module *School-Based Supervision for Students* was the need and publication of a handbook. It is recommended that a handbook for the learning module is published and given to all the participants in the program. The handbook should include all learning sub-modules, activities, and guidelines. The handbook can be used individually or as a group assignment, and is

most efficient when all the activities are strictly followed. Designers should always study and analyze supplementary learning modules and techniques to ensure that a continuous process of research and development of the learning module takes place.

15.2 Recommendations for Future Research

Many universities in Thailand provide learning management through learning modules. However, there is a lack of relevant research studies. This is evident from the small number of research literature related to learning modules in higher education, including bachelor's degree, master's degree, and doctoral degree students.

The authors suggest the development of learning modules be applied at the graduate school level and doctoral degree program in Educational Management and Leadership, in order to support the development of creative thinking and 21st-century innovations.

The authors also recommend a comparative study of the learning achievement between the learning module technique with other teaching methods for educational management in higher education.

XVII. CONCLUSION

The developed learning module was successful and achieved the following results: 1) The efficiency of the action process in the learning module was 84.76,while the efficiency of knowledge was 82.26, which is higher than the specified criterion of 80/80; 2) the quality of the learning module, in relation to propriety, congruence, feasibility, and utility aspects was at "The Highest" level; 3) the effectiveness index of students was 0.7679; 4) the posttest learning achievement was significantly higher than the pretest at .01; 5) no significant differences occurred between the posttest and the pretest, indicating that learning retention had been achieved; 6) students' satisfaction with the learning module was at "The Highest" level.

Therefore, a study and research on the development of innovative module lessons of course 41306 by applying it to the Google Classroom software package, which has a manual for both learners and learners. Teachers have a relationship in accordance with the context and local conditions, atmosphere, and can learn together with both learners. fellow students online learning resources Instructors have adapted themselves to be facilitators. It has raised the quality of students in both the knowledge sector, practical skills, good knowledge to study this course and love to learn continuously throughout. Be creative in implementing it as attached appendix (1).

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Notes:

Note 1 Appendix (1): Questionnaires for Student Satisfaction on Teacher Quality and Learning Support, Faculty of Education, Northeastern University.

APPENDIX (1)

Questionnaire for Student Satisfaction on Teacher Quality and Learning Support Faculty of Education Northeastern University Second Semester / 2020

Explanation:

1. The questionnaire aims to survey the level of students' satisfaction with the quality of teaching of teachers and learning support.
2. This questionnaire has 3 sections. Please answer all sections.
3. Answering this questionnaire will not affect students' learning and teaching. The Faculty of Education will keep students' responses confidential. But will present the overall assessment results to be a guideline for the development and improvement of teaching and learning to be more appropriate and effective.
4. Please mark ✓ in the box that is most realistic for the benefit of teaching quality assessment.

Section 1 General information of respondents for the assessment

1. **Sex** ⬜ Male ⬜ Female

2. **Faculty** .....

3. **Student Level** ⬜ Bachelor degree ⬜ Master's Degree ⬜ Ph.D. ⬜ Others

4. **Course assessed by students** Course ED 41306 Educational Policy and Strategic Plan Development

5. **Instructor** Associate Professor Chalard Chantarasombat, Assistant Professor Prayuth Chusorn

Section 2 Satisfaction with the teaching quality of teachers and learning support

Explanation:

1. Practical Sections answer every question except question 2.
2. Theoretical Sections, answer every question except question 3.
3. Theoretical and Practical Sections, answer every question.

Subject	Satisfaction Level				
	Highest	High	Medium	Low	Lowest
1. Subject matter					
1.1 Consistency of subject with the objectives of the learning course?					
1.2 Is the content significant and beneficial to the actual use?					
2. Teaching skills of teachers (Assessing the theoretical courses)					
2.1 Step by step instructions that are easy to understand?					
2.2 Clear answers and provide examples to explanations for clearer understanding?					

2.3 Apply modern research results or information in teaching?					
2.4 Bridge the lessons to practical implementations in real world applications?					
2.5 Employs a variety of teaching methods and stimulates the interest of students?					
2.6 Efficient use of classroom period?					
2.7 Inclusions of morals and ethics during teaching?					
2.8 Assign appropriate work?					
2.9 Have knowledge and ability in the subject matter?					
3. Teaching skills of teachers (Assessing the practical course)					
3.1 Step by step instruction, easy to understand according to the learning module lesson?					
3.2 Clearly explain, demonstrate and give examples according to methods and procedures?					
3.3 Have knowledge and capability in using materials / equipment?					
3.4 Sufficient time to complete tasks, assignments and to achieve common goals?					
3.5 Documents / manual with clear instructions to follow?					
3.6 Encouragement for students to practically perform?					
3..7 Have the ability to solve problems that occur during practices?					
4. Characteristics of teachers					
4.1 Emotionally strong, stable, sensible?					
4.2 Demonstrating appropriate gestures?					
4.3 Dresses appropriately?					
4.4 Neutrality and cares for the students wellbeing?					
4.5 Good role model for students?					
4.6 Punctuality of attendance and termination?					
4.7 Attend regularly And learn with students?					
5. Teacher and Students Relationship					
5.1 Promoting opinions / sharing experiences?					
5.2 Encourage creative thinking and criticism?					
5.3 Allocate time for students outside the classroom?					
5.4 Consultancy to individual students (resulting in learner development in analytical and intelligence skills)?					

5.5 Attentive and friendly with students and promote teamwork?					
5.6 Opportunity for asking questions and promoting individual and group work?					
5.7 Listen to opinions / comments from students for improvements?					
6. Learning Support					
6.1 Learning location and resources that are conducive to the teaching and learning activities?					
6.2 Quality of the media, text books, innovations, learning modules and learning sets?					
6.3 Interesting teaching media and aids in the learning and understanding of the learning module?					
6.4 Media suitable for the course and provide examples of case studies					
6.5 The general atmosphere is conducive to online learning.					
6.6 Study Trips, practical activities, or results presentations?					
7. Measurement and Evaluation					
7.1. Appropriately define criteria for academic performance?					
7.2 Measurement and assessment of teaching / learning activities?					
7.3 Report the evaluation to students?					
7.4 Measure and evaluate students correctly / fairly as required?					
7.5 Should students be given an evaluation portfolio / work piece for single or group assignments?					
7.6 After learning, the learners have knowledge, ability, higher skills and good attitude?					
8. In summary, is the teacher effective and effective in teaching and learning?					

Section 3 Additional recommendations (strengths to develop and meet standards or weaknesses for further improvement of teaching and learning)

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Thank you to all respondents for your cooperation

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