Journal for the Education of Gifted Young Scientists, 7(4), 1249-1261, December 2019
e-ISSN: 2149- 360X
http://jegys.org

Research Article

Web Application of Knowledge Management in Broiler Production in Agriculture for Vocational Education

Injana WUTTIKORN[1], Phonpakdee RATCHADAKORN[2], Poungsuk PAKKAPONG[3], and Petsangsri SIRIRAT[4]

Received: 17 September 2019 **Accepted:** 1 December 2019

Abstract

This study aimed to: 1) construct and find the efficiency of web application of knowledge management in broiler production and 2) test and find the learning achievement after using the Web application. The research instruments in this study were: 1) an assessment form for the efficiency of the web application of knowledge management in broiler production and the web application was assessed by 7 specialists and 2) learning achievement test in the production of commercial broilers was used by 100 students in the program of higher vocational certificate at 4 Colleges of Agriculture and Technology in Thailand. The data were analyzed by using the mean, standard deviation, and independent sample t-test. The results of the study revealed that the efficiency of web application has a high level. The pretest-posttest control group design was used in the comparison of control groups (45 students who did not use the web application) and experimental group (55 students who use the web application). The results found that the experimental group had mean score higher than the control group significantly at the level of 0.05.

Keywords:

knowledge management, web application, broiler production, learning achievement, vocational education

To cite this article:

Wuttikorn, I., Ratchadakorn, P., Pakkapong, P., & Sirirat, P. (2019). Web Application of Knowledge Management in Broiler Production in Agriculture for Vocational Education. *Journal for the Education of Gifted Young Scientists, 7*(4), 1249-1261. DOI: http://dx.doi.org/10.17478/jegys.621360

[1] Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, wuttikorn_2007@msn.com. ORCID ID:0000-0003-3136- 685x

[2] Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, ratchadakorn.ph@kmitl.ac.th ORCID ID: 0000-0001-5818-9027

[3] Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, ORCID ID: 0000-0002-6876-7318

[4] Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, ORCID ID: 0000-0002-4828-1740

Introduction

In the 21st century, the world community has the firm intention of facilitating education by constructing 3 skills for the new generations: foundational literacies, competencies, and character qualities. This relates in particular to ICT literacy and the creation of appropriate innovation in the workplace (World Economic Forum, 2016). It can be seen that the use of technology is an important aspect for humans in the 21st century to have knowledge and skills about the use of appropriate technology. This aims to create a successful innovation in the workplace and achieve the goal of knowledge management to maintain and transfer body of knowledge, especially agriculture (Intorrathed, 2013). As a matter of fact, Thailand has clearly declared itself to be the "Kitchen of the World" due to its geographical appropriateness and skilled workforce. Broiler production in Thailand has a high efficiency, both in quantity and quality, and this makes the country rank fourth in the world. In other words, Thailand exported broiler productions that reached 700,000,000 kg. This generated an income to the country for 90 million baht (Office of system development and livestock product certification, 2016). Due to the large and modern agro-industrial system in the country, it needs to use a large amount of skilled workforce to cope with it. Interestingly, the farm animal husbandman and the farm veterinarian play important roles in the animal production system. That is to say, the farm animal husbandman takes good care of the health and yields of the farm animals. The farm veterinarian also takes good care of the health of the farm animals, cures and heals them in the event of an animal sickness or disease outbreak. Also, his duty includes the control of vaccination and the use of antibiotics with livestock.

For the production processes of animal husbandry and veterinary in Thailand, it can be found in College of Agriculture and Technology. In this regard, the teaching/learning facilitation equally places importance on theories and actual practice. It is important to note that the body of knowledge about agriculture is different from that of other fields in the case that it requires practical operation to be proficient. At present, there are differences in the development of basic factors such as chicken strains and management between the private sector and educational institutes. This means that several bodies of knowledge transferred from educational institutes do not respond to the private sector as they should be (Injana, et al, 2015). In addition, there is a limitation on bio-safety. This is based on procedures designed to protect humans and animals against diseases or harmful biological agents (Adfca, 2014). This has an effect on the product of animal husbandman and veterinarians, so the teaching/learning facilitation needs to be improved until the Web E-learning System (WELS) occurs. The Web E-learning system has become a new method used for practicing skills in the task operation of both the educational sector and the industrial sector (Daniel & Yi-Shun, 2008). Therefore, the web application is very important for the forms of agricultural production (Mativanun & Jayagopal, 2019). Also, it is a new alternative used for the practice of new generations that have a

skilled workforce, particularly on bio-safety. It can be said that the adoption of web application together with agricultural teaching/learning is an interesting innovation that can respond to task operations, whether or not.

Problem of Research

Only knowledge in the agricultural school cannot response to broiler farm work of private enterprises. Learning by practice will create knowledge that can be used in actual works (Saduak, 2019; Musika, 2019). However, the students cannot practice in the broiler farm of private company because of the biosecurity farming system. Web application for knowledge management of broiler production help students to gain knowledge about broiler production farming in the private farm. Since the web application is a simulation of broiler production system in the private farm such as strain, sex age, vaccine program and amount of drinking water, an amount of diet in each age interval, and weight gain based on the age of chicken. The knowledge in the web application come from practices of animal husbandman that not show in the any book.

Method

Research Model

The design used in this research were descriptive research and experimental research. The Pretest-Posttest Control Group Design (Trimongkhonkul & Chattraporn, 2012) was used in the experimental research for testing the web application together with the integrated of Tortop (2013) about learning process with Meaningful Learning Method (Predict-before the lecture; Observe- in the lecture; and Explain - after the lecture) and find out the learning achievement.

Participants

7 specialists on broiler production were asked to assess the efficiency of the web application of knowledge management in broiler production. 100 students in the program of higher vocational certificate done by using multi-stage sampling from all Colleges of Agriculture and Technology in Thailand. They were divided into 2 groups: control group (45 students who did not use the web application) and experimental group (55 students who use the web application) to compare the score.

Data Collection Tools

The first tool in this research was an assessment form for finding the efficiency of the web application of knowledge management in broiler production.

Content validity was employed to find the quality of the assessment form. The assessment form was analyzed by 3 specialists to determine the IOC value (index of item-objective congruence). The results found that the IOC value of the assessment form is 0.753. That means the quality of the assessment form is good. It can be used to assess the web application.

The second tool in this research was learning achievement test in the production of commercial broilers. The test was tried out with 44 students who similar to the

participants in this research. Difficulty, discrimination, and reliability in SIM (Simple Item Analysis) software package were employed to find the quality of the test. The results found that the 40 items from 71 items was appropriate difficulty and discrimination to evaluate learning achievement. The reliability value of the learning achievement test was 0.892. That means the 40 items of the test can be used to evaluate the learning achievement.

Data Analysis

Mean, standard deviation, and independent sample t-test were used in data analysis.

Process

This study consists of the following steps:

Constructing and finding the efficiency of the web application of knowledge management in broiler production.

Constructing a web application for knowledge management in broiler production.

The documentary review is at this step. The obtained data were analyzed and synthesized, including broiler rearing methods, knowledge management methods, web application construction methods, etc. The construction of this web application is based on the Delphi technique and knowledge management/broiler production specialists (Injana et al, 2019). It consists of 4 parts: (1) member admission, (2) Table of broiler production processing, (3) operational schedule, and (4) general data.

This knowledge management comprises the following 7 steps:

Knowledge indication; this indicated what knowledge was essential to broiler production, such as strain, sex, age, vaccine program and amount of drinking water, an amount of diet in each age interval, and weight gain based on the age of the chicken.

Knowledge construction and seeking; this indicated the step of knowledge finding, and if it is not available, it must be constructed.

Knowledge processing and screening; this step considered what knowledge was essential to broiler production. Incorrect knowledge was eliminated; otherwise, broiler production might be damaged.

Arrangement of the knowledge to be systematic; clear systematic knowledge had an effect on successful learning and accessibility.

Knowledge accessibility; an individual who would like to use this knowledge could access it and utilize it completely in the form of knowledge provision and seeking.

Knowledge exchange; everybody had learning potential but not equally. Hence, knowledge exchange was an important mechanism to create the development of a higher level of learning. They could transform tacit knowledge into explicit knowledge. This knowledge could be maintained for a long time (Collins, 2010).

Learning step; this was the step that created the development of knowledge and innovation used for production. It includes the construction of a form of complete knowledge management in learning facilitation and the development of agencies of farms to be endless learning organizations.

Finding the efficiency of knowledge management in broiler production (web application of knowledge management in the broiler production), seven specialists on broiler production were asked to assess the efficiency of the web application of knowledge management in broiler production.

Testing and finding the learning achievement after using the Web application. The experimental group and the control group took the learning achievement test before studied broiler production. After that experimental group studied broiler production by using the Web application. Control group studied broiler production by a broiler production teacher. Again the experimental group and the control group did the learning achievement test. The score of control group and experimental group were compared both before and after studied broiler production.

Results

The web application for knowledge management in broiler production for students of higher vocational certificate majoring in Animal Science comprises 4 parts:

Part 1: Member admission consisting of a username, a number of chickens to be reared, chicken strains, a number of rearing days, and chicken sex. The farm location was in the steps of knowledge indication, knowledge construction, and knowledge seeking.

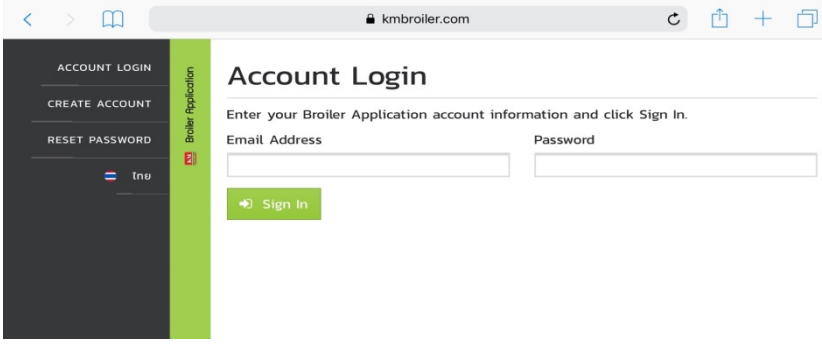
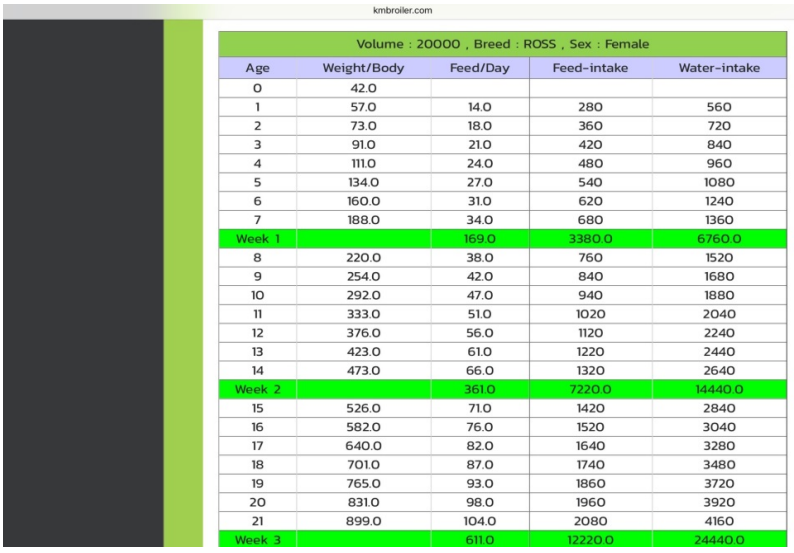


Figure 1.

Member Admission Part

Part 2: Tables showing broiler production outcomes consist of feed/water intake and chicken weight. This was in the steps of knowledge screening, arrangement of knowledge system, and knowledge accessibility.



Volume : 20000 , Breed : ROSS , Sex : Female				
Age	Weight/Body	Feed/Day	Feed-intake	Water-intake
0	42.0			
1	57.0	14.0	280	560
2	73.0	18.0	360	720
3	91.0	21.0	420	840
4	111.0	24.0	480	960
5	134.0	27.0	540	1080
6	160.0	31.0	620	1240
7	188.0	34.0	680	1360
Week 1		169.0	3380.0	6760.0
8	220.0	38.0	760	1520
9	254.0	42.0	840	1680
10	292.0	47.0	940	1880
11	333.0	51.0	1020	2040
12	376.0	56.0	1120	2240
13	423.0	61.0	1220	2440
14	473.0	66.0	1320	2640
Week 2		361.0	7220.0	14440.0
15	526.0	71.0	1420	2840
16	582.0	76.0	1520	3040
17	640.0	82.0	1640	3280
18	701.0	87.0	1740	3480
19	765.0	93.0	1860	3720
20	831.0	98.0	1960	3920
21	899.0	104.0	2080	4160
Week 3		611.0	12220.0	24440.0

Figure 2.

Table of Broiler Production Processing

Part 3: Task operation schedule includes fixing task operation in advance, such as checking the weight gain, vaccination, and antiseptic spraying. This was in the steps of the arrangement of knowledge system, knowledge screening, knowledge accessibility, knowledge exchange, and learning.

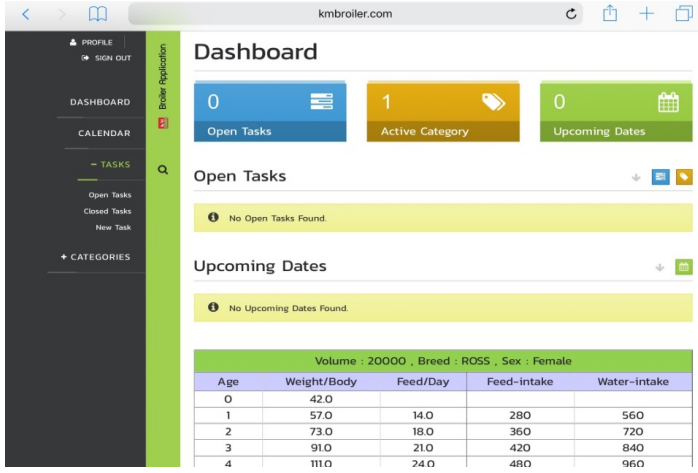
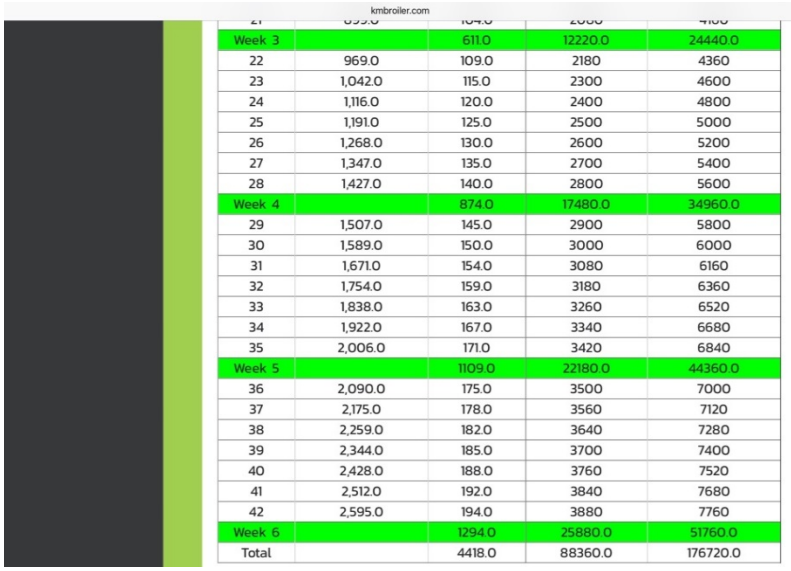


Figure 3.

Task Operation Schedule

Part 4: General data comprises wind force, relative humidity, and temperature at the location of the broiler rearing. This was in the steps of knowledge indication, knowledge construction and seeking, and knowledge management to be systematic.



Week 3		611.0	12220.0	24440.0
22	969.0	109.0	2180	4360
23	1,042.0	115.0	2300	4600
24	1,116.0	120.0	2400	4800
25	1,191.0	125.0	2500	5000
26	1,268.0	130.0	2600	5200
27	1,347.0	135.0	2700	5400
28	1,427.0	140.0	2800	5600
Week 4		874.0	17480.0	34960.0
29	1,507.0	145.0	2900	5800
30	1,589.0	150.0	3000	6000
31	1,671.0	154.0	3080	6160
32	1,754.0	159.0	3180	6360
33	1,838.0	163.0	3260	6520
34	1,922.0	167.0	3340	6680
35	2,006.0	171.0	3420	6840
Week 5		1109.0	22180.0	44360.0
36	2,090.0	175.0	3500	7000
37	2,175.0	178.0	3560	7120
38	2,259.0	182.0	3640	7280
39	2,344.0	185.0	3700	7400
40	2,428.0	188.0	3760	7520
41	2,512.0	192.0	3840	7680
42	2,595.0	194.0	3880	7760
Week 6		1294.0	25880.0	51760.0
Total		4418.0	88360.0	176720.0

Figure 4.

General Data

Table 1.

Operational System for Knowledge Management of the Web Application in Broiler Production

Ranking	Step of knowledge management	Operational system of web application for knowledge management in broiler production
1	Knowledge indication	Indication of the chicken strain, several days of rearing, vaccination program, sex of the chicken to be reared, giving vitamins/minerals/antibiotic
2	Knowledge construction/seeking	Preparing a data processing table on the outcomes of broiler production, weight gain, and an amount of feed/drinking water
3	Knowledge screening	Preparing a data processing table on the outcomes of broiler production, weight gain, and an amount of feed/drinking water
4	Arrangement of knowledge system	Preparing a data processing table on the outcomes of broiler production, weight gain, and an amount of feed/drinking water
5	Knowledge accessibility	The operation system was used on the internet system. Data accessibility control was done by means of a password that could be accessed everywhere
6	Knowledge exchange	Data were sent to the counselor team on chicken rearing on the website: www.km broiler.com

7	Learning	Be able to prepare a model table on data processing of broiler production

According to Table 1, it can be seen that the web application of knowledge management in broiler production comprises all 7 steps of knowledge management.

The steps indicated in this study to prepare steps for knowledge management in broiler production are as follows: 1) knowledge indication, 2) knowledge construction and seeking, 3) knowledge screening, 4) arrangement of knowledge system, 5) knowledge accessibility, 6) knowledge exchange, and 7) learning.

2. Results of an assessment of the efficiency of the web application on knowledge management in broiler production prepared by 7 specialists.

Table 2.

Results of an Assessment of the Efficiency of the Web Application on Knowledge Management in Broiler Production (N=7)

Item	Level of efficiency		
	Mean	**S.D.**	**Description**
1. Knowledge indication	3.82	0.53	High
2. Knowledge construction and seeking	3.45	0.29	High
3. Knowledge screening	3.45	0.42	High
4. Arrangement of knowledge system	3.65	0.74	High
5. Knowledge accessibility	3.71	0.45	High
6. Knowledge exchange	3.74	0.35	High
7. Learning	3.71	0.32	High
Mean	**3.65**	**0.30**	**High**

Remark:

Mean		Descriptive equivalence (quality/efficiency)
4.21 – 5.00	=	Highest
3.41 – 4.20	=	High
2.61 – 3.40	=	Moderate
1.81 – 2.60	=	Low
1.00 – 1.80	=	Lowest

According to Table 2, as a whole, the efficiency was found to be at a high level (mean = 3.65). Based on its details, knowledge indication was found at the highest mean in this this table (mean = 3.82), followed by knowledge exchange (mean = 3.74). However, knowledge construction and seeking and knowledge screening were found to have the least mean of efficiency (mean = 3.45).

2. The results of the use of the web application on knowledge management in broiler production by students with higher vocational certificate majoring in Poultry Production, Colleges of Agriculture and Technology are shown in Tables 3 and 4.

Table 3.

Comparisons of an Average Mean Score of Knowledge before Using the Web Application of the Experimental and Control Groups

The sample group	n	Mean	S.D.	t	Sig.
Experimental group	55	21.92	3.83	1.57	0.11
Control group	45	20.73	3.71		

According to Table 3, there was no statistically significant difference in the knowledge of the experimental and control groups before studying broiler production (mean = 21.92 and 20.73, respectively). This implies that they have no difference in knowledge before studying broiler production.

Table 4.

A Comparison of an Average Mean Score of Learning Achievement after Using the Web Application of the Experimental and Control Groups (Independent Sample T-Test was Used)

The sample group	N	Mean	S.D.	t	Sig.
Experimental group	55	26.41	3.60	2.93	0.00*
Control group	45	24.37	3.32		

Statistically significant difference at 0.05

According to Table 4, it was found that there was a statistically significant difference of knowledge between the experimental and control groups. That is, the learning achievement of the experimental groups was higher than that of the control group. This denotes that the web application truly enhanced the knowledge about broiler production of the experimental group.

Discussion and Conclusion

The construction and assessment of the efficiency of web based knowledge management in broiler production comprises 7 steps as follows: 1) knowledge indication, 2) knowledge construction and seeking, 3) knowledge screening, 4) arrangement of knowledge system, 5) knowledge accessibility, 6) knowledge exchange, and 7) learning. This conforms to the study by Ungsitthipoonporn & Larbarporn (2016) on Knowledge Management (KM): Transmitting local wisdom of the Hakka community on-line-successes and challenges. Also, it conforms to the study by Khopornklang *et al.* (2018) on the factors related to knowledge management process of the Institute of Dentistry, Department of Medical Services, Ministry of Public Health. Not only this, it also conforms to a study by Sommart & Kosaiyanon (2011) on Knowledge Management for the Development of the Yala Provincial Administrative Organization. In general, knowledge management of web applications in broiler production is highly efficient. Based on its details, the knowledge indication has the high level of efficiency (mean = 3.82, S.D. = 0.53). The

web application can truly indicate the data necessary for broiler production, such as the indication of the broiler strain to be reared, the days of rereading, the sex of the broilers to be reared, and the amount of feed and water for broiler production, as well as weight gain based on rearing. This is consistent with the study of Jarutheerasanti (2015) on the methods for knowledge management in the industrial sector: a case study of industrial estates throughout Thailand. It was found that the indicator is the identification of the knowledge required by an organization, such as the skill matrix and job specification. Pramphet & Sungtong (2015) had conducted a study on a knowledge management model for teacher development: a case study of the Nampudpotaram Cluster School, Trang Primary Educational Service Area Office. It was found that the knowledge indication is an important component for teacher professional development through knowledge management. There are two aspects having least efficiency found in this study: knowledge screening (mean=3.45, S.D.=0.42) and knowledge construction/seeking (mean=3.45, S.D.=0.29). This conforms to the study by Arpomo, *et al.* (2017) on the state of knowledge management at Maha Sarakham Rajabhat University. This may be because knowledge screening relies on a high level of skills or tacit knowledge. Besides, there are concerned supporting factors, such as the production environment and the stability of feed quality. Although, knowledge construction and seeking has a high level of efficiency, it is the least among the 7 steps (mean=3.45, S.D.=0.29). The knowledge used in the actual practice is mainly the tacit knowledge that arises from actual practice. In addition, it is not easy to transfer it to other people, but it is important to solve problems in actual practice. This is in line with Changsap, *et al.* (2017) who claims that innovation can help reduce errors at work and help increase the efficiency of work performance. According to the learning achievement after using the web application on knowledge management in broiler production, it is found that the experimental and control groups gain an average mean score of 26.41 and 24.37, respectively.

This means that the experimental group has a higher level of learning achievement than the control group with a statistical significance level at 0.05. This corresponds to the findings of Suetomi (2014) who states that the application is a factor that affects learning achievement.

The web application on broiler production was designed for the facilitation of agricultural education. It consists of 4 parts: member admission, table of production processing, practice schedule, and general data. For the assessment of the efficiency of the web application, it is found that the web application has a high level of efficiency. Regarding learning achievement after using the web application, it is

found that the experimental group has a higher level of learning achievement than the control group with a statistical significance level of 0.05. This is in accordance with a study by Ali (2014) on the effect of inquiry-based learning method on students' academic achievement in science courses. It was found that this process, which is different from the previous one, has an effect on a better learning achievement (Ramadhani, et al, 2019). This implies that the constructed web application on knowledge management in broiler production really helps to enrich the knowledge on broiler production (Kara, 2019).

Acknowledgements

This work was supported by specialists of broiler production and students of Colleges of Agriculture and Technology in Thailand. Without them, this research could not have been accomplished. I would like to thank them for cooperating in data collection.

Biodata of the Author

Mr.Wuttikorn Injana is a PhD student in Agricultural Education program at King Mongkut's Institute of Technology Ladkrabang. He also is an area manager of Bumbud Pattana Company Limited, Thailand.
Affiliation: Department of Agricultural Education, King Mongkut's Institute of Technology Ladkrabang, Thailand, 10520.
Email: wuttikorn_2007@msn.com

Dr.Ratchadakorn Phonpakdee is associate professor at King Mongkut's Institute of Technology Ladkrabang. She is expert in agricultural educational.
Affiliation: Department of Agricultural Education, King Mongkut's Institute of Technology Ladkrabang, Thailand, 10520.
Email: ratchadakorn.ph@kmitl.ac.th

Dr.Pakkaoung Poungsuk is associate professor at King Mongkut's Institute of Technology Ladkrabang. He is expert in rural development.
Affiliation: Department of Agricultural Education, King Mongkut's Institute of Technology Ladkrabang, Thailand, 10520.
Email: pakkapong.po@kmitl.ac.th

Dr.Sirirat Petsangsri is assistant professor at King Mongkut's Institute of Technology Ladkrabang. She is expert in educational technology.
Affiliation: Department of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Thailand, 10520. **Email:** sirirat.pe@kmitl.ac.th

References

Adfca (2014). *Guidelines of biosecurity general aspects of biosecurity volume 1*. Abu Dhabi Food Control Authority Endorsed by BOD 03 November 2014. https//www.adfca.ae/English/PolicyAndLegislations/Guidelines/Documents/Guide.

Ali, A. (2014). The effect of inquiry-based learning method on students 'academic achievement in science courses. *Universal Journal of Educational Research,* 2(1): 37-41.

Apinya, K., Wawta, T., & Jutharat, S. (2018). Factors Related to knowledge management process of Institute of Dentistry, Department of Medical Services, Ministry of Public Health. *Library Journal*, *Srinakharinwirot University*, pp.14-29.

Arpamo, W., Au-areemit, S., & Wongprasert, C. (2017). The state of knowledge management of Rajabhat Maha Sarakham University. *Journal of Information Science*, *35*(4), 92-114

Changsap, B., et al. (2017). A comparison of anatomy learning achievement and affecting factors of the students learned by the application of AIC Technique and the Conventional Method. *Huachiew Chalermprakiat Academic Journal*, pp. 29-39.

Collins, H. (2010). *Tacit and explicit knowledge.* The University of Chicago Press, 60037, Chicago Ltd, London.

Daniel, Y.S., & Yi-Shun, W. (2008). Multi-criteria evaluation of the web-based e-learning system: A methodology based on learner satisfaction and its applications. *Computers & Education*, *50*(3), 894-905

Injana, W., Intorrathed, S., Phonpakdee, R., & Poungsuk, P. (2015). Knowledge management adoption of animal husbandry on broiler farms in western Thailand. *International Journal of Agricultural Technology*, *11*(8), 2295-2300. http://www.ijat-aatsea.com ISSN 1686-9141 2295.

Injana, W., Phonpakdee, R., Poungsuk, P., & Petsangsri, S. (2019). Creation of a knowledge management process in broiler production of Thailand. *International Journal of Agricultural Technology*, *15*(2), 273-286. http://www.ijat-aatsea.com ISSN 1686-9141 2295.

Intorrathed, S. (2013). *Principles of agricultural education.* Bangkok: Mean service

Jaratheerasanti, P. (2015). The methods for knowledge management in industrial sector: A case Study of industrial estates throughout Thailand. *Humanities and Social Science Research Promotion Network Journal: HSRNJ*, pp.60-72.

Mativanun, S., & Jayagopal, P.A. (2019). Big data virtualization role in agriculture: A comprehensive review. *Walailak Journal Science and Technology*, *16*(2), 55-70.

Musika, A , Poungsuk, P , Siriwan, N , & Intorrathed, S . (2019). Relationship between Curriculum and Instructional Materials of Non-formal Agricultural Higher Education. *Journal for the Education of Gifted Young Scientists*, *7*(3), 515-529. DOI: 10.17478/jegys.605364

Kara, N. (2019). Impact of digital media on gifted students' career choices. *Journal for the Education of Gifted Young Scientists, 7*(2), 99-112. DOI: http://dx.doi.org/10.17478/jegys.555339

Office of system development and livestock product certification. (2016). Available at: http://certify.dld.go.th/certify/index.php/th/2016-10-10-12-15-38

Roengprapan, C. (2002). *Basic statistics together with examples of analyses by using Minitab SPSS and SAS*. Khonkaen: Khonkaen University.

Ramadhani, R., Umam, R., Abdurrahman, A., & Syazali. M. (2019). The Effect of Flipped-Problem Based Learning Model Integrated with LMS-Google Classroom For Senior High School Students. *Journal for the Education of Gifted Young Scientists*, *7*(2), 137-158. DOI: http://dx.doi.org/10.17478/jegys.548350

Pramphet, W., & Sungtong, E. (2015). Model of knowledge management for teacher development: A case study of Nampudpotaram Cluster School, Trang Primary Educational Service Area Office 1. *Journal of Liberal Arts Prince of Songkla University*, *7*(2), 59-77.

Saduak, W., Poungsuk, P., Phonpakdee, R, & Deeying, S. (2019). School Agricultural Learning Center for Sustainable Agricultural Learning. *Journal for the Education of Gifted Young Scientists*, *7*(3), 389-407. DOI: 10.17478/jegys.582993

Sommart, M. & Kosaiyanon, L. (2011). Knowledge management for the development of Yala Provincial Administrative Organization. *Local Administration Journal.* pp. 100-114.

Suetomi, K. (2014). Reform of the education finance system as the foundation of compulsory education. Educational Studies in Japan: *International year book*. 8:143-158.

Trimongkhonkul, P., & Chattraporn, S. (2012). *Research Design. 7th edition.* Bangkok: Kasetsart University Press.

Tortop, H.S. (2013). Meaningful field trip in education of the renewable energy technologies. *Journal for the Education of Gifted Young Scientists*, *1*(1), 8-15. DOI: 10.17478/JEYSG.201318998.

Ungsitthipoonpor, S., & Laparpon, K. (2016). Knowledge Management (KM): Transmitting local wisdom of the Hakka community on-line-success and challenges. *Language and Culture Journal*, pp. 203-225.

World Economic Forum (2016). *New vision for education: Fostering social and emotional learning through technology*. http://www3.weforum.org/docs/ WEF_New_Vision_for_Education.pdf.