

*Developing an Online Knowledge Center Model to Enhance the Necessary Skills  
for Workers in Industrial Enterprises*

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**Abstract**

The objective of this research was to develop an online knowledge center model to enhance necessary skills for workers in industrial enterprises. The development process showed that 1) there were 8 major components of this kind of online knowledge center model: concept and goal, internal/external content and internal/external courses, technology, search/information retrieval system, community/sharing, knowledge center teams, knowledge center rules, and data analytics. 2) The skill development and enhancement process through an online knowledge center model can be looked at from both the perspective of the service providers and the perspective of the end users. For the service providers there are 5 steps: 1) setting the conceptual background and setting goals, 2) designing the online knowledge center, 3) developing and setting up the online knowledge center, 4) analyzing and reporting on the results, and 5) improving the online knowledge center based on evaluation. For the end users there are 6 steps: 1) preparation, 2) registration, 3) utilizing the online knowledge center as a member of an industrial community, 4) utilizing the content and courses in the online knowledge center, 5) applying the knowledge gained in work and life situations, and 6) sharing what one learned within the community.

Keywords: Online Knowledge Center, Necessary Skills for Workers, Industrial Enterprises, Vocational Skills, Adult Online Education

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## **Introduction**

The dynamic trends and movements of the world in the 21st century have forced Thailand to confront many challenges, including both external pressures caused by globalization and advancements in science and technology, and internal pressures from demographic, environmental, economic, social and political changes. In particular, the fact that much more of the world of work has become digital has had serious impacts on the lives and future opportunities of working people. Digital technology, combined with new tools and devices, has in many cases reduced the need for human labor. Therefore, it is imperative to prepare people with appropriate skills that match their individual abilities and their potential, while also matching the situation of society and the economy as a whole (International Labour Organization, 2017). Learning and education that can help people raise their skill levels, or “up skill,” and learn ways to handle new tasks, or “reskill,” is necessary to support the labor market of the future. Working people will need the ability to work together with people, machines, automated systems and robots. The demand for digital and technology-related skills is pressuring working people to develop new skill sets all the time if they want to continue to be employed. “The Future of Jobs Report 2018” by the World Economic Forum, based on the results of a worldwide survey of employers at various kinds of enterprises, stated that employers thought 54% of workers are in need of upskilling and reskilling.

The COVID 19 crisis helped highlight the importance of online learning for people of every age group. People of working age can scarcely avoid working online anymore. In their free time, they are encouraged to seek out online training to gain beneficial new skills and knowledge or to hone their expertise in their chosen field. Although the COVID 19 situation has improved, online learning is definitely still expanding. To further encourage the growth of essential online learning opportunities, access should be expanded so they can reach more segments of the population (OECD, 2020). In managing online learning and training in order to upskill and reskill workers to match the demands of employers now and in the future, one thing the service providers should take into account is that to take full advantage of online learning opportunities, learners first have to possess sufficient digital proficiency. They also need to have access to an adequate computer or similar device that is well suited for online learning, and there must be an adequate internet connection. The service providers face the challenge of presenting worthwhile content and courses in an online learning format and also building quality assurance mechanisms into the system to make sure that the end users’ online learning experience is worth the investment and the time spent. Online knowledge centers are a format that meets the needs of the present situation and can reduce problems associated with limitations of time, place and budget for learning. They can help give working people who are already employed an important learning resource through which they can refine and expand their skills and access specialized knowledge for their careers. The online knowledge center model is a realistic, practical and sustainable way to achieve these goals.

In the first phase of this research on developing an online knowledge center model to enhance necessary skills for workers in industrial enterprises, the researcher surveyed the opinions of 385 workers in primary industries in Nonthaburi Province and nearby areas about the main skills that they thought were important and desired to support work in the digital era. The skills that the survey respondents valued included literacy, ability to get the gist of what is presented, ability to write clearly and understandably, ability to summarize key points, ability to think rationally, problem-solving skills, creative thinking skills, ability to work successfully with unusual and diverse people and environments, ability to work with others to

achieve goals, teamwork skills, leadership and ability to coordinate people with different skills to work together, other professional skills for each line of work, ability to learn, and lastly, kindness, discipline and morality.

When the workers were surveyed on their opinions of the ideal format of an online knowledge center to enhance necessary skills for workers in industrial enterprises, the majority responded that the best platform/provider would be a website, followed by eLearning and, lastly, an online social network. For the second topic of “form of access to an online knowledge center,” most of the respondents favored providing free public access, followed by “both open to the public and to members who register,” and lastly, “open only to registered members.”

The third survey topic explored components of an online knowledge center. Five major components were identified: 1) a professional career development curriculum most survey respondents thought the online knowledge center should have a curriculum composed of work-oriented courses that were developed independently and also some units or resources sourced from other agencies associated with various industrial fields and enterprises; 2) media and information within the online knowledge center most survey respondents thought the center should be a compilation of many kinds of media about industrial, vocational and professional skills that people could access online by themselves for independent study; 3) internal support systems most survey respondents thought the system should provide good security for online knowledge center users, and efficient data storage, with search and retrieval functions organized into categories for different industries and careers; 4) channels for interaction most survey respondents thought the system should be designed to include an online meeting component, and should enable communication on smart phones via social media apps like Line or Instagram, and should include a chat room; 5) devices for using the online knowledge center – most of the survey respondents thought that users would probably access the center through smartphones, portable laptop computers or desktop computers (Supanida and Dungbhorn, 2021).

To develop the draft online knowledge center model for this research, the researcher reviewed relevant literature and analyzed the results of the previous opinion survey of 385 workers in primary industries in Nonthaburi Province and nearby areas to gain insight into the best approaches and necessary foundational principles for developing an online knowledge center model to enhance necessary skills for workers in industrial enterprises.

### **Research Objectives**

The objective was to develop an online knowledge center model to enhance necessary skills for workers in industrial enterprises.

### **Extent of the Research**

The research was divided into 2 phases.

Phase 1: Develop a draft of the online knowledge center model. The evaluators were a group of 3 educational technology experts.

Phase 2: Certification of the developed online knowledge center model to enhance necessary skills for workers in industrial enterprises by qualified experts.

The experts invited to consider approving and certifying the model consisted of (1) fourteen experts on educational technology and (2) one measurement and evaluation expert, for a total of 15 experts.

## **Research Method**

Phase 1: A draft online knowledge center model to enhance necessary skills for workers in industrial enterprises was developed in 3 steps:

Step 1.1 Review of the literature and data analysis about online knowledge centers, their components, steps of development, and the opinions of industrial workers about different aspects of online knowledge centers and online learning centers.

Step 1.2 Write up a draft model for a proposed online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Step 1.3 Get educational technology experts to evaluate the draft online knowledge center model.

Phase 2: Fifteen qualified experts are asked to certify the online knowledge center model to enhance necessary skills for workers in industrial enterprises.

## **Research Tools**

Phase 1: A questionnaire about opinions on the proposed draft model of an online knowledge center model to enhance necessary skills for workers in industrial enterprises.

Phase 2: A certification form to approve the online knowledge center model to enhance necessary skills for workers in industrial enterprises.

## **Statistical Analysis**

The descriptive statistics of mean and standard deviation were used to analyze data on evaluation and recommendations that were gathered using an evaluation form with each item rated on a scale of 1 to 5.

## **Research Findings**

After completing step 1. (Review of the literature and data analysis), step 2. (Writing up a draft model for a proposed online knowledge center model to enhance necessary skills for workers in industrial enterprises), and step 3. (Getting educational technology experts to evaluate the draft online knowledge center model), the researcher revised the draft model according to recommendations. The revised model is shown in Figure 1.

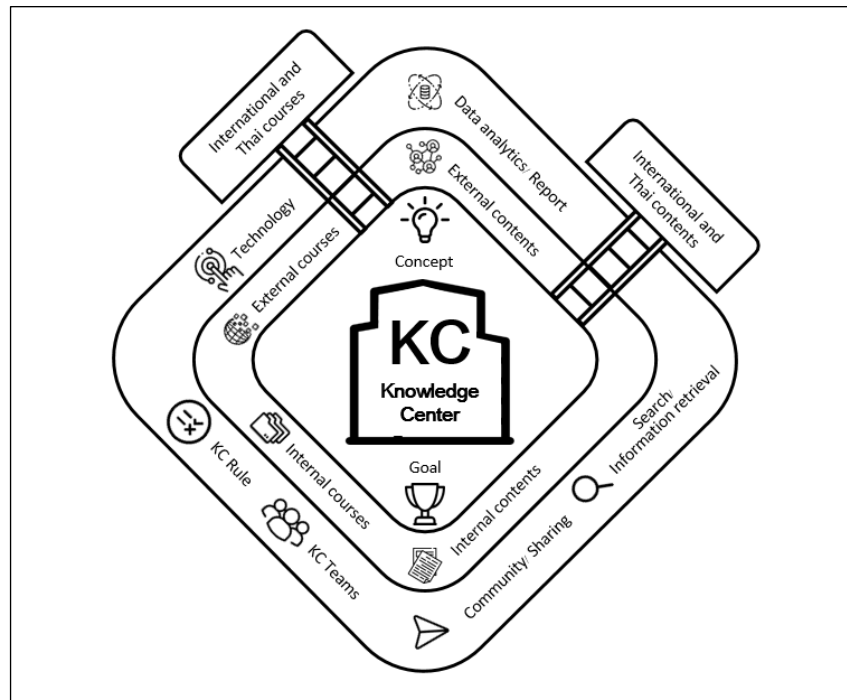


Figure 1: Model of an online knowledge center to enhance necessary skills for workers in industrial enterprises

***The online knowledge center model to enhance necessary skills for workers in industrial enterprises has 8 components:***

**Component 1. *Concept and Goal*** – Identifying, defining and understanding the concept of an online knowledge center model and concepts surrounding the idea of enhancement of necessary skills for workers in industrial enterprises was the first important component before initiating development work. The underlying concepts also remained pertinent for the stage of operation of the center. The objective of enhancing skills for workers in industrial enterprises formed the major conceptual framework for defining the center’s concept and goal. The online knowledge center was to operate under the principles of skill enhancement for adult workers in different industries so they could adapt to extremely rapid changes in the workplaces of the 21st century. One central concept was to equip workers with knowledge and skills they could build on for their careers in the future. Another primary goal was to provide a source of knowledge, information, educational media and links to related agencies for people working in the industrial sector.

**Component 2. *Internal/External Content and Internal/External Courses*** – One of the main parts of the online knowledge center is the content and course materials, which consist of both educational content developed by the service providers themselves and some media, training programs or courses that are sourced from external agencies. Both internal and external parts must be up to standard and truly beneficial for end users in their work lives.

**Component 3. *Technology*** – Of course, technology is an essential component for facilitating network connections, data storage and database management, and data transmission so the service provider can provide and manage services efficiently. The component of technology has to be very stable and secure as well as high capacity so that it can handle the needs of a

large number of users at any given time. The technology component comprises internet, information technology devices and a cloud system.

**Component 4. *Search/Information Retrieval System*** – The important point of this component is that all the content should be well organized in different categories and topics. The types of content relating to different industries and enterprises and different kinds of work should be well managed in an orderly way so it will be easy to search for and access any specific topic an end user is interested in finding. The online knowledge center will contain a wealth of resources with diverse and rich data, but ideally each end user should be able to retrieve the data they want on a given topic instantly. The search system component and the information retrieval component will facilitate both the service providers and the end users.

**Component 5. *Community/Sharing*** – The main point of this component is to create and build online community networks of users in similar lines of work and in the same industries. Members of each network can then share and exchange useful information relevant to their work. They can communicate knowledge about their work challenges and experiences in a friendly, creative and constructive social atmosphere. This kind of community interaction will contribute greatly to end users' efforts to upskill and reskill. Members can also use the online communities as a venue to spread knowledge that they have gained from learning at various sources to give others new viewpoints and to launch beneficial discussions where different members can contribute new knowledge and useful observations at any time. The community/sharing component consists of online communities, online sharing and exchange of knowledge, and online dissemination of ideas.

**Component 6. *Knowledge Center Teams*** – Naturally, the online knowledge center is conceived, designed, developed, built, managed, and used by people, so the teams of individuals involved in all these functions are essential to help the online knowledge center reach its goals. The major teams are the data and content selection and inspection team, the content production and development team, and the IT team.

**Component 7. *Knowledge Center Rules*** – Clearly stated and legally correct rules are needed to ensure the smooth management of the online knowledge center, to protect the security and privacy of the users, to make sure there is no copyright infringement, and that sources are properly cited. The rules for members to follow should be written out and should include rules specified by the online knowledge center itself and those that apply to relevant government or international laws and regulations including copyright laws, trademark laws, personal privacy laws, human rights laws and computer malfeasance laws.

**Component 8. *Data Analytics*** – This component is necessary for data analysis and reporting. It comprises both analysis of end user data and a data reporting system.

#### ***Necessary skill enhancement for workers in industrial enterprises through the use of the online knowledge center model***

There consisted of the form of the online knowledge center model for **service providers** and the form of the online knowledge center model for **end users** with the following details.

***The form of the online knowledge center model for service providers there were 5 steps:***

Step 1. *Planning and setting goals* – The consultation team and the administrative team joined stakeholders to set the conceptual background and set goals for establishing the online knowledge center as a source of learning that could connect workers in different places to foster the development of knowledge and exchange of ideas. The goal was to compile and develop lessons and courses that working people could choose from according to their needs and interests and access at their convenience, from anywhere and at any time, to upskill and reskill as needed.

Step 2. *Designing the online knowledge center* – The administrative team designed the content, curriculum, technology, data search and retrieval systems, rules, related teams of personnel, online community functions, data analytics, and reporting systems of the online knowledge center based on the concepts and goals that were identified.

Step 3. *Developing and setting up the online knowledge center* – The online knowledge center was developed by the following personnel:

- (1) The content and curriculum selection/inspection team rated and chose items to make available in the center and transmitted information about them among communities in the network of industries.
- (2) The internal content development team studied, planned and developed course materials and content for the center, produced content, and evaluated all the materials and content produced.
- (3) The IT team was responsible for front end work, back end work, and social media work.

Step 4. *Analyzing and reporting on the results* – The evaluation team analyzed data about end users and their utilization of the center to find correlations, to make reports and to form guidelines for developing the online knowledge center.

Step 5. *Improving the online knowledge center based on evaluation* – Content and features of the online knowledge center were updated and improved based on the data from the evaluations in step 4 and feedback from end users.

All 5 steps are shown in Figure 2: Online knowledge center format for *service providers*.

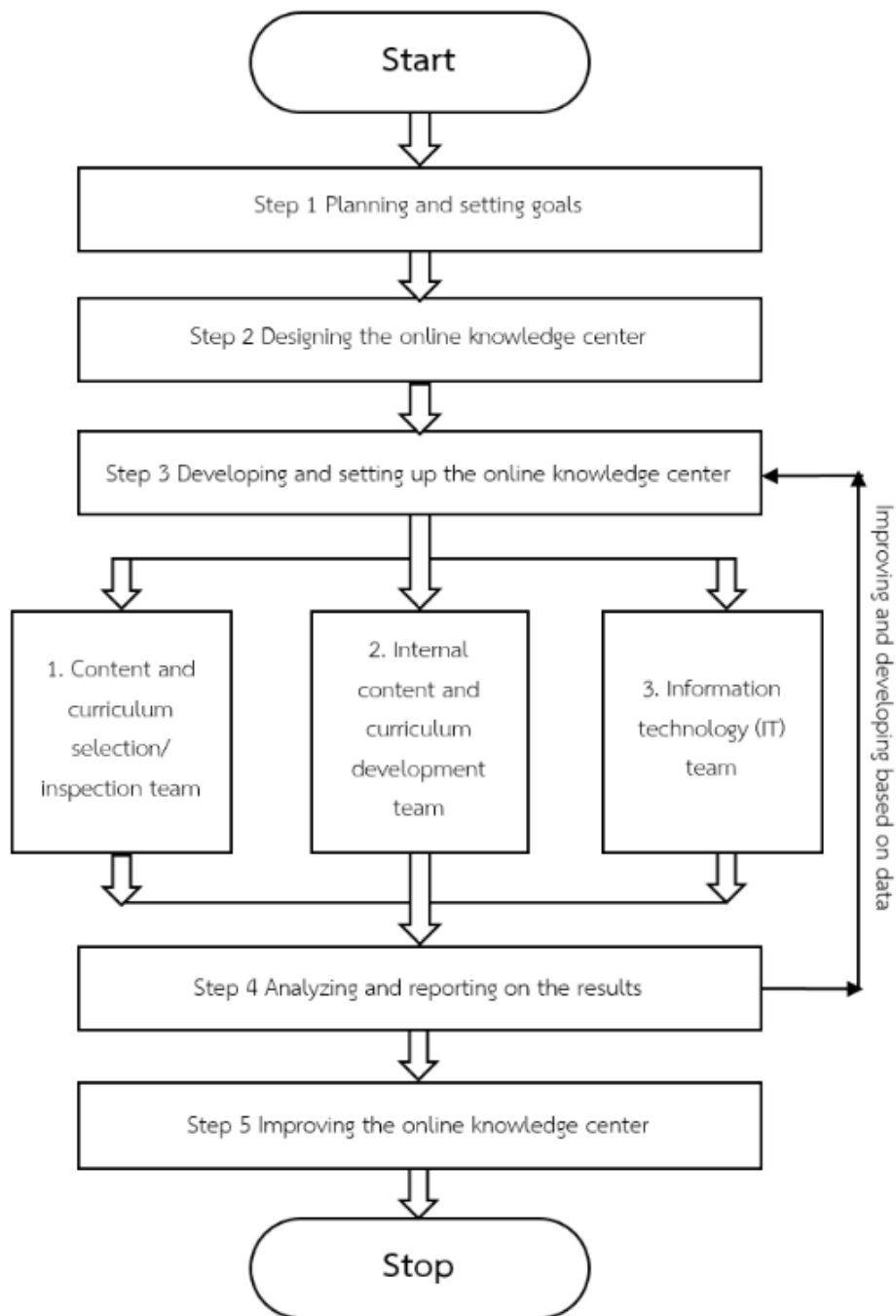


Figure 2: Online knowledge center steps for *service providers*

***The form of the online knowledge center model for end users had 6 steps:***

**Step 1. *Preparation*** – For infrastructure, the end users had to prepare devices and equipment, data storage equipment, an electrical system, and internet access. For their personal preparation, they had to become familiar with how the online knowledge center works, how to learn and study, how to search for information, and how to communicate with others.

**Step 2. *Registration*** – Each end user had to register and create an account, and after that they could access the networks of online communities and all the courses and content in the online knowledge center.



Step 3. *Utilizing the online knowledge center as a member of an industrial community* – Using the main start page of the online knowledge center website, members can read and add news, exchange ideas, share opinions, and share experience and expertise. The web-boards can be used to express opinions and interact with other members/users. There is a help desk where users can ask questions and get assistance with any problem they may encounter using different functions of the online knowledge center.

Step 4. *Utilizing the content and courses in the online knowledge center* – End users can choose all kinds of content and courses from among both those developed internally and the selected external resources, to upskill and reskill as desired. Each course has an introduction that explains the steps, learning activities, and evaluation from the start to the end so users can meet all the learning objectives.

Step 5. *Applying the knowledge gained* – After learning from the courses and content as desired, the end users can apply what they have learned to develop their personal work process and that of their work unit and organization. The online knowledge center will ask for feedback on the results to evaluate how useful and beneficial the content really is in each case.

Step 6. *Sharing what one learned within the community* – After passing through all of the above 5 steps, the end users can apply and practice the new knowledge, techniques, methods and skills they learned as well as demonstrating them and teaching them to others in the online knowledge center community through the feed. This is an additional resource for members of the community who work in the same industry. The content people share will be screened and vetted by the content inspection team before it is broadcast.

All 6 steps are shown in Figure 3: Online knowledge center format for *end users*.

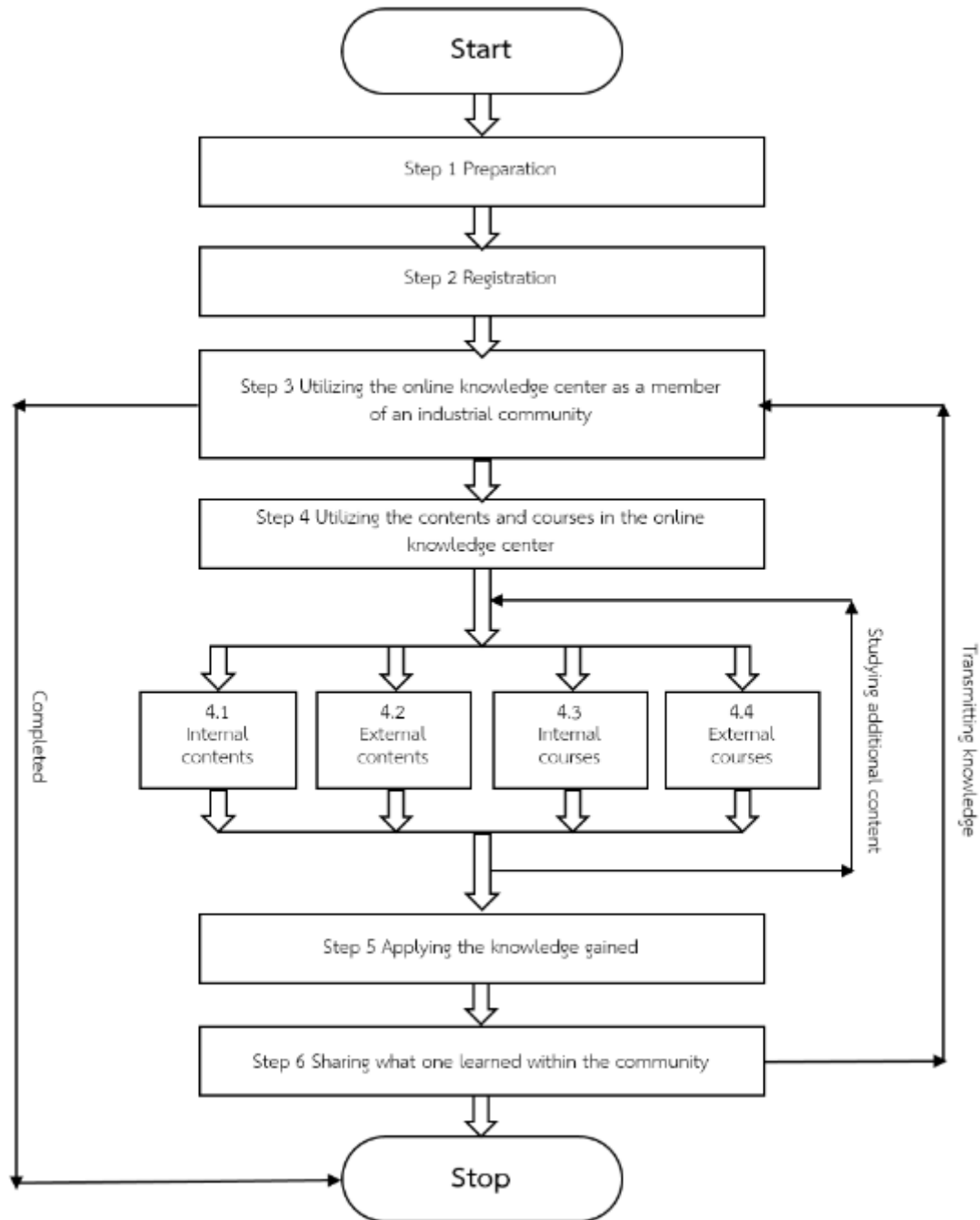


Figure 3: Online knowledge center steps for *end users*

## Discussion

The development of an online knowledge center model to enhance necessary skills for workers in industrial enterprises showed that there were 8 components: 1) concept and goal, 2) internal/external content and internal/external courses, 3) technology, 4) search/information retrieval system, 5) knowledge center teams, 6) community/sharing, 7) knowledge center rules, and 8) data analytics. As for the format of the online knowledge center to enhance necessary skills for workers in industrial enterprises, for the service providers there are 5 steps: 1) setting the conceptual background and setting goals, 2) designing the online knowledge center, 3) developing and setting up the online knowledge center, 4) analyzing and reporting on the results, and 5) improving the online knowledge

center based on evaluation. For the end users there are 6 steps: 1) preparation, 2) registration, 3) utilizing the online knowledge center as a member of an industrial community, 4) utilizing the content and courses in the online knowledge center, 5) applying the knowledge gained in work and life situations, and 6) sharing what one learned within the community. This is similar to the online learning center of Disability Leaders of Tomorrow (2019). The components of the Disability Leaders of Tomorrow online learning center (DLoT.ed) were a registration system, assistance, a venue for expressing opinions, and a platform with the training curriculum.

Our results were also consistent with research by Kwanying Sriprasertpaph et al (2015) on the development of an online community called “The ICT-Loving Thai Teachers Network.” They identified 10 components of the online community that helped keep it operating: use of the system by members, the fact that it was a system that arose through synthesis, the strength of the methods of communication used, the emphasis on self-made media produced by members, the fact that most media were images and text, the use of activities in the online community that involved exchange and learning, the fact that content came from both direct experience and summarizing items found on external sources, the use of internet search engines, devices used to access the online community using the internet, and evaluation and constructive criticism from online community members.

Further, our research results correspond to those of Supaporn Sornsithirat (2016) from a report on a study of the development of a knowledge management format for a professional community network using online social media that aimed to promote proficiency enhancement and professional expertise accumulation for civil servants. The community network’s knowledge management consisted of 5 major components: personnel, process, networking, technology, and professional community culture. Knowledge management for the professional community network using online social media had 7 steps: orientation, practical training, self-led knowledge management, one-to-many knowledge management, one-on-one knowledge management, group knowledge management, and knowledge evaluation.

Our findings regarding the steps of promoting necessary skill enhancement for workers in industrial enterprises were similar to the findings of Jaroen Poowijit (2021), who reported that there are 8 methods to achieve results efficiently when managing online teaching/learning: 1) clearly define and state the approaches to online learning; 2) design content and methodology that matches the learners’ interests; 3) choose suitable online teaching tools; 4) encourage learners to work together online; 5) utilization through both group work and individual work; 6) making use of each learner’s existing resources; 7) opening teaching opportunities by letting learners summarize or reflect on lessons and share their learning experiences; and 8) periodically adjusting and making improvements on the online teaching management based on feedback elicited from learners.

Looking at it from the dimension of studies about promoting online learning specifically for adult learners, some conclusions from our study resembled those in an article by the OECD (2020) about lessons from the COVID 19 crisis regarding the potential of online learning for adults, which suggested that promoting online training for adults can help open up opportunities to reach a very large number of learners. The OECD concluded that online learning can be a very valuable alternative to in-person training. If an individual can find a way to improve relevant work skills in an efficient way that is up to international standards, then that avenue can lead to long-standing employment opportunities, and online training can

also increase productivity for companies and the economy as a whole. However, an interesting problem about online learning on a global scale is that if we want all adults to benefit from it on an equal basis, we have to first make sure that every adult has the required digital skills and computer and internet access. Online learners also have to have sufficient personal incentives to want to upgrade their skills. The lesson the COVID 19 global pandemic crisis taught us is that it is possible to overcome various limitations to make online learning as effective as possible, because in fact when it is absolutely necessary, then everyone can adapt and find ways to continue living under new challenges.

The results of the present study in terms of the perspective of the end users of the online knowledge center also echo the observations of Johnny Wood (2021), who wrote on the increase in the number of people learning online. He wrote that interest in online learning tended to grow from 2016 to 2021, because it was documented that in that period the number of applicants registering for open educational resources (OERs) and Massive Open Online Courses (MOOCs) rose approximately 32%. This increase suggests that online education and learning has gained greater public acceptance, and more people are willing to seek online distance education and online learning opportunities as a way to raise their level of knowledge even if they are in remote locations.

Similarities were also seen with the work of Alessandro (2018), who wrote about the components of online learning under the framework of the European commission in 2020, which comprises both digital learning and online learning. Digital learning covers a wide range of diverse learning formats and method that can be combined using different software to support digital learning. Online learning is learning based on using the internet, and can include the use of social media applications to create joint learning experiences for many learners together. Online learning can be individual and personal or can have group work components. It can take place at any time and in any place using a mobile device or a stationary device. It mostly relies on open educational resources.

## **Recommendations**

### **Recommendations for Using the Research Results**

Several things should be taken into account when using the developed model for an online knowledge center in order to make sure that the enhancement of necessary skills for workers in industrial enterprises is done really effectively.

In terms of the components of an online knowledge management center, researchers should study and develop new tools, and should assess the content and courses that were internally developed by the online knowledge center team to determine if they really met the needs of skill enhancement for workers in industrial enterprises. The people in charge of content and course production and content and course selection should study the actual current situation and demand for different skills in different industrial sectors.

In terms of the equipment used by the end users of the online knowledge management center, when standards and specifications are decided on and set, the technology team should survey and think about what kinds of devices and technology the majority of end users already own or have access to. If most users have to upgrade their equipment, this would mean an added cost burden. For some, they might decide that because of the added equipment cost, it would

not be worth it to invest in skill enhancement through the online knowledge management center.

In terms of online community building and sharing knowledge and experiences, the venue for this should be very easy to use. It should have design features that encourage continued participation and frequent interaction. The team in charge of operating the online knowledge management center should create incentives for people to participate in the online communities.

### **Recommendations for Future Research**

In this research, an online knowledge center model for enhancing the skills necessary for workers in industrial enterprises was developed. The model can serve as guidelines for creating this type of online knowledge center. Further research should assess the actual use of the online knowledge center by real workers in industrial enterprises in the real world to see how beneficial it is, and if the skill enhancement is impactful and long-lasting. Then the results could be used to develop, improve and raise the standard of the online knowledge center.

### **Conclusion**

In summary in this study, entrepreneurs, researchers, or academics take the elements and steps of the online knowledge center model to promote necessary skills for workers in industrial establishments to create an online knowledge center for use with real workers. Based on 8 major components of this kind of online knowledge center model: concept and goal, internal/external content and internal/external courses, technology, search/information retrieval system, community/sharing, knowledge center teams, knowledge center rules, and data analytics. Including, the skill development and enhancement process through an online knowledge center model can be looked at from both the perspective of the service providers and the perspective of the end users. Entrepreneurs and stakeholders adapt this online learning center model and create an online knowledge center to serve workers, which is another approach for upskilling and reskilling sustainably.

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