



Development of Inquiry Learning Model Based on Information Literature Skills for Total Quality Management Courses

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Abstract

This research aims to develop an inquiry learning model based on information literacy skills for the total quality management course. This research uses research and development (R&D)—data collection techniques using questionnaires, interview guidelines, observation, as well as tests and non-test. The data analysis techniques used are (a) data reduction, (b) presenting the data, and (c) drawing conclusions and verifying the subjects of this research are students at the Management and Accounting Study Program, Trianandra College of Economics (STIE) Jakarta. The results of this study indicate that the information literacy-based inquiry learning model developed through research and development has proven to be effective in improving learning outcomes and information literacy skills of students majoring in management at STIE Trianandra Jakarta. This is evidenced by the results of small group trials which show the average student pretest results are smaller than the average post-test results (36.33, < 41.69), with the difference in the value of the two is 5.36. b. The information literacy-based inquiry learning model developed through research and development is feasible to be implemented as a learning model in the TQM course at the STIE Anandra Jakarta management study program. First, the characteristics of the appropriate students are all digital natives, and are already familiar with digital devices, Second, based on the results of small trials and large group trials, both students and lecturers assessed that the learning group materials developed through research and development had good interest in the aspects of attracting attention, relevance, self-confidence, and satisfaction.

Keywords: *Inquiry Learning; Literature Skills; Management Course*

Introduction

The rapid development of communication and information technology, especially the internet, supported by the continued emergence of new digital tools, has presented new opportunities for the advancement of the world of education. Internet features that allow academics to access and exchange various sources of information quickly and easily make it the essential tool for searching for any

information (Lung, Ling Chi, and Wei, 2017) and make it the primary source of student information retrieval in completing lectures (Solangaarachchi, Marasinghe, Abeygunasekera, Hewage, & Thulani, 2016).

Referring to the Cambridge International 2018 census results regarding the use of technology in schools around the world, it was found that students in Indonesia use technology in the classroom more than in many other countries, beating more developed countries. Indonesian students are the highest globally in the use of IT rooms or computer rooms (40%). They are also the second-highest in the world, behind the United States, for using a desktop computer (54%). The report also shows that more than two-thirds of Indonesian students (67%) use smartphones in class, and more use them to do homework (81%).

The report above illustrates how technology and information have become inseparable in students' daily lives, both on campus and at home. This can be an opportunity and a challenge for teachers at universities to accommodate changes in student information-seeking behavior through the application of learning models that are by the characteristics of students who are digital natives. These students were born in the era of technology and information and grew up thriving among technologies. In other words, these digital native learners spend their time interacting with technologies such as "computers, video games, music players, video cameras, cell phones and all the other toys and tools of the digital age" (Prensky 2001)

According to Ellis & Goodyear (2010), an inquiry model is a pedagogical approach widely used in university learning. The results of interviews with lecturers in the Total Quality Management course at the Triandara College of Economics (STIE) Jakarta, inquiry learning models are the main models used in the learning (Harsanti, 2018; Irawan & Iasha, 2021). Apart from being by the characteristics of students as adult learners accustomed to learning independently, these models are also used to improve research and problem-solving skills based on the cases presented to them. However, the application of these inquiry models did not run optimally as expected. This is caused by a lack of student knowledge about the quality of the information needed, relevance to the assigned topic, citation procedures, and data's ethical and legal use. As a result of this lack of knowledge, in carrying out research tasks, students mostly copy-paste sources from the internet without paying attention to scientific principles (Asrifah et al., 2020; Wahyudiana et al., 2021).

The description above illustrates that instead of improving investigative, critical thinking, and problem-solving skills, lecturers' inquiry models in learning foster plagiarism among students. This explains that students' habits of interacting with the internet and other technological tools do not necessarily make them skilled in searching for information. This is similar to the results of Lwehabura's research (2018), which found that although students, in general, are accustomed to accessing the internet, very few have mastered key aspects of searching for information from electronic sources, such as searching for information using Boolean operators, using filters, synonyms and concept maps (Harsanti, 2018; Oktafikrani, 2020).

Inquiry-based learning can be an efficient and powerful learning approach because it is responsive to the need to optimize student engagement in learning (Lazonder & Harmsen, 2016). However, this approach can fail if the guidance provided is inadequate. Kirschner, Sweller, and Clark (2006) note that a synthesis of 72 empirical studies suggests that advice is critical to the success of inquiry-based learning. Learners who are provided with guidance are more skilled during assignments, are more successful in obtaining information relevant to their investigative topics, and score higher on tests of learning outcomes after appointments (Andayani et al., 2022; Sumantri et al., 2022).

To successfully apply this model, students need to be prepared for thinking skills at a more complex level by integrating problems, resources, and digital tools. Careful inquiry and learning activities planning will help participants develop investigative skills effectively and efficiently (Sari et al., 2022;

Sumilat et al., 2022). Several research results found that inquiry-based learning models can develop not only intellectual abilities but also the potential of other students, including developing emotional intelligence including research (Andrini, 2016), critical thinking skills (Duran and Dokme, 2016), and persistence in learning (learning persistence) (Mukhoiyaroh, Atmoko, & Hanurawan, 2017), However, Lazonder and Harmsen (2016) in their research remind, the application of the inquiry learning model can fail if it is not guided adequately. Based on the analysis of 72 research results, there is empirical evidence that guidance is very important for the success of the inquiry-based learning (Aisyah et al., 2020; Zulela et al., 2022).

The description above shows that inquiry learning is a constructivist learning model centered on learners and requires them to be actively involved in searching for information to solve the problems faced. Learning with information requires students to have knowledge of the tools used in the investigation process, use computers and software to find, store, and use information, have knowledge of research resources and tools, have a basic understanding of the quality of information, and skills critical for evaluating the information found at each step of the investigative process (Sudrajat et al., 2018). Thus, applying inquiry-based learning models commonly used in higher education will only be effective when planned properly by considering various aspects that support the successful application of these models (Suryanto et al., 2017).

The opinion above illustrates that learning in today's information-rich environment requires students to have information management skills, including identifying information needs, searching for, selecting relevant and quality information, and building new meanings to become knowledge. In other words, inquiry requires information literacy skills. The use of technology and information in today's information-rich environment can only be optimized to support the achievement of better student learning outcomes if students have the prerequisite skills to manage this much information.

Based on the description above, in this study, the researcher intends to develop a guided inquiry learning model that integrates information literacy skills for the Total Quality Management course for Management Study Program students at the Trianandra College of Economics, Jakarta.

Research Method

This study uses research and development (R&D) methods. The research design selected used a mixed-methods design. The data collected in this study were from a preliminary study (need assessment), expert validation results, and a series of formative evaluations, which included one-on-one tests with students, small group tests, and field tests. Need assessment data were collected through questionnaire instruments, interview guidelines, and observation sheets. The instrument used in this research is the instrument used to conduct preliminary research and formative evaluation. The instrument used in this research is the instrument used to conduct preliminary research and formative evaluation, which includes: 1) expert validation, 2) one-on-one test with students, 3) small group test, and 4) field test. Data analysis of this research used qualitative and quantitative approaches adapted to the type of data collected.

Table 1. Grid of needs analysis instruments (needs assessment)

Information to Look for	Indicators	Data collection technique	Instrument Type	Respondent
Student performance	a. Student performance gap b. Cause of gap	Interview, study documentation	Interview guide, checklist	Lecturer, Academic Section

Information to Look for	Indicators	Data collection technique	Instrument Type	Respondent
Current learning conditions	a. Lesson planning b. Implementation of learning c. Learning assessment	Interview	interview guidelines	Lecturer, student
Readiness of lecturers and students	Readiness to integrate technology into learning	Survey	Questionnaire	Lecturer, student
Availability of facilities and infrastructure	a. Availability of technology b. Availability of facilities and infrastructure	Interview, observation	Interview guide, checklist	Dean of FIP

Table 1. Grid of expert validation instruments (expert review)

Information to Look for	Indicator	Data collection technique	Instrument Type	Respondent
Quality of Instructional Materials	a. The truth of the content according to the field of science	Interview	interview guidelines	Material Expert
	b. Up-to-date content according to the field of science	Interview	interview guidelines	Material Expert
	c. Relevance to instructional objectives	Interview	interview guidelines	Instructional design expert
	d. The correctness of technical terms	Interview	interview guidelines	Materials expert
	e. TIU formulation accuracy	Interview	interview guidelines	Instructional design expert
	f. Whether or not the instructional analysis is adequate	Interview	interview guidelines	Instructional design expert
	g. Relevance of ICT to TIU	Interview	interview guidelines	Instructional design expert
	h. ICT formulation accuracy	Interview	interview guidelines	Instructional design expert
	i. Relevance of the test to instructional purposes	Interview	interview guidelines	Instructional design expert
	j. Technical quality of test writing	Interview	interview guidelines	language expert
	k. Relevance of instructional strategies including content to instructional objectives	Interview	interview guidelines	Instructional design expert
	l. Relevance of the product to the test	Interview	interview guidelines	Instructional design expert
	m. Relevance of the product to instructional purposes	Interview	interview guidelines	Instructional design expert

Information to Look for	Indicator	Data collection technique	Instrument Type	Respondent
	n. Technical quality of instructional products	Interview	interview guidelines	Material Expert,
	o. The suitability of the image with the content of the material	Interview	interview guidelines	
	p. Accuracy of font and typeface selection	Interview	interview guidelines	graphic design expert,
	q. photo clarity	Interview	interview guidelines	graphic design expert,
	r. Image clarity	Interview	interview guidelines	graphic design expert,
	s. Color selection accuracy	Interview	interview guidelines	graphic design expert,
	t. The suitability of the material with the photo	Interview	interview guidelines	graphic design expert,
	u. The suitability of the material with the image	Interview	interview guidelines	graphic design expert,
	v. The attractiveness of interface design	Interview	interview guidelines	graphic design expert,

Table 2. Instrumental Grid for small group trials and field trials

Information to Look for	Indicator	Data collection technique	Instrument Type	Respondent
Quality of Instructional Materials	a. Understanding of the content of the lessons in the teaching materials	Interview	interview guidelines	Lecturer, student
	b. Teaching materials make it easier for students to understand the topics being taught	Interview	interview guidelines	Lecturer, student
	c. Difficulties encountered in understanding the language used in learning materials	Interview	interview guidelines	Lecturer, student
	d. Difficulty understanding terms used in instructional materials	Interview	interview guidelines	Lecturer, student
	e. In the teaching materials there are many examples and descriptions	Interview	interview guidelines	Lecturer, student
	f. Descriptions and examples in learning materials can clarify the material	Interview	interview guidelines	Lecturer, student
Eligibility of Instructional	g. The ability of learning materials to increase the	Survey	Questionnaire	Lecturer, student

Information to Look for	Indicator	Data collection technique	Instrument Type	Respondent
Materials	attention of lecturers and students			
	h. Relevance of learning materials to the needs of lecturers and students	Survey	Questionnaire	Lecturer, student
	i. The ability of learning materials to increase the self-confidence of lecturers and students	Survey	Questionnaire	Lecturer, student
	j. The ability of learning materials to increase the satisfaction of lecturers and students	Survey	Questionnaire	Lecturer, student

Result and Discussion

Result

Based on the results of research and development of an inquiry learning model based on information literacy skills, several conclusions can be obtained, namely as follows:

This inquiry learning model based on information literacy skills was developed through a combination of two instructional design models, namely the model adapted from the education research and development systems approach model (The Steps of the Systems Approach Model of Educational Research and Development (R & D) which consists of the following steps: stages, including a) preliminary research, b) identification of instructional needs and general-purpose writing, and c) instructional analysis, d) analysis of student characteristics and learning contexts, e) writing specific instructional objectives, f) developing assessment instruments, g) developing learning strategies, h), developing learning materials, and i) formative evaluation. The conclusions of each stage are described in detail as follows:

Preliminary Research Stage

The conceptual framework development step examines the concepts that underlie the development of the model to be developed, including the concept of a learning model, the concept of inquiry learning, and the concept of information literacy skills. Some conclusions from the steps of developing a conceptual framework are as follows:

- a. The learning model is a system consisting of various interrelated components that guide the teacher during the learning process to achieve certain goals more systematically and efficiently.
- b. Inquiry learning is an inquiry learning model which is learning model designed to teach students the skills, knowledge, and dispositions needed to think systematically to answer important questions directly into the scientific process.
- c. Information literacy skills are a set of abilities to recognize information needs for information, find, evaluate, and use the required information efficiently, effectively, and ethically.

Needs Analysis

The results of the needs analysis produce the types of knowledge and skills that must be possessed by students in the Total Quality Management course.

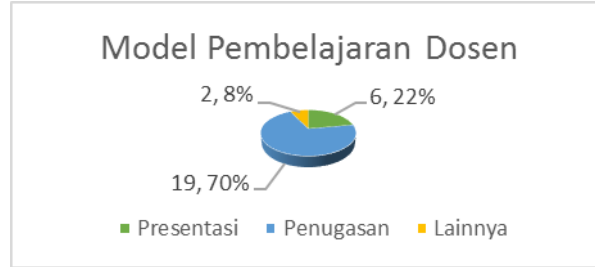


Figure 1. Lecturer Learning Model

Figure 1 illustrates that the learning model used by lecturers is generally more in the form of direct learning through presentations (22%) or through assignments to students (70%). However, lecturers also use other models such as project-based learning (8%). This shows the need to develop a new learning model that accommodates the development of communication and information technology so that learning is not monotonous and in accordance with the characteristics of students as a digitally native generation.

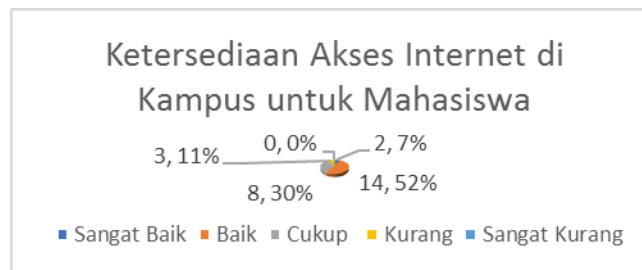


Figure 2. Availability of internet access on campus

Figure 2 shows that based on student perceptions, campuses provide sufficient internet access for students, making it possible to develop learning models for learning in an online environment (online).

Instructional Analysis Results

The results of the instructional analysis produce a concept map of general behavior into specific behaviors that are arranged logically and systematically which describe general behavior in detail and are arranged according to their position.

The Results of the Characteristics of Students and the Learning Context

The analysis of students yielded information that the age of the students was not far from each other with a difference of 2-3 years so they tend to have the same hobbies and habits, the majority of students live in a place not too far from campus, most of the students have not worked, and all of them have digital devices for learning purposes that can be connected to the internet properly.



Figure 3. Age of Students

Figure 3 shows that the majority of students who are the targets of research and development of information literacy-based inquiry learning models are in the age range of 2-3 years, the rest are in the below age range, namely 18-20 years (11%), and the age range above, ie >23 years (37%). However, overall, the ages of students are relatively not far from one another, so communication between students is possible to be well established because at these ages they tend to have the same hobbies and habits.

Results of Writing Specific Instructional Objectives

The writing of specific instructional objectives resulted in the formulation of specific instructional objectives written based on the ABCD criteria which included element A (Audience), namely the target students who were targeted in learning, namely students who took the Total Quality Management course at the Management Study Program STIE Trianandra, Jakarta, B (Behavior), which is the performance that students are expected to achieve after completing the learning process, C (Condition), which is the performance limit that students must display which is expected to occur, and D (Degree) which is the level of performance that students can do after participating in learning.

Development of Assessment Instruments

The stages of developing the assessment instrument resulted in an assessment blueprint and assessment instruments in the form of test items spread over a series of formative evaluations in the developed teaching materials as well as on the pretest and posttest instruments.

Development of Learning Strategies

The development of an information literacy-based inquiry learning strategy produces a learning strategy that includes learning steps that adopt a flipped-classroom approach that includes the stages of inquiry learning and information literacy components. The learning stages consist of three main components, namely: 1) the before class stage which contains activities including a) the delivery of a brief description of the learning material, b) an explanation of the relevance and benefits of the material, c) and the delivery of learning objectives, 2) the during stage. The class contains the stage of presentation of learning, including a) explanation of learning materials, b) giving examples and non-examples, exercises, c) implementation of formative tests, d) submission of summaries, and e) glossary explanations, 3) after class which contains activities -activities include: a) providing feedback, b) follow-up activities, and c) self-reflection activities.

Development of Learning Materials

The development of learning materials resulted in two research products, namely: 1) guidelines for implementing information literacy-based inquiry learning models for lecturers, and 2) guidelines for implementing information literacy-based inquiry learning models for students. The display of teaching materials in the form of a manual for lecturers and a manual for students which also serves as a guide for the implementation of the developed model is visualized in Figure 4.

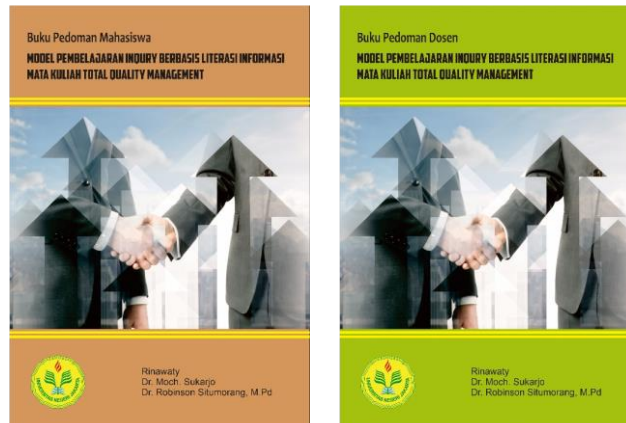


Figure 4. Display of manuals for lecturers and handbooks for students

Formative Evaluation Stage

The formative evaluation stage produces recommendations for improvement in both the content and technical aspects of writing and packaging of developed instructional materials to produce learning products that are more accurate or more effective as learning materials in TQM courses at STIE Trianandra Jakarta.

- a. The information literacy-based inquiry learning model developed through research and development has proven to improve learning outcomes and information literacy skills of students majoring in management at STIE Trianandra Jakarta. This is evidenced by the results of small group trials which show the average student pretest results are smaller than the average post-test results (36.33, < 41.69), with the difference in the value of the two is 5.36. Meanwhile, the paired sample t-test showed a t-value of -3.418 with 8 degrees of freedom. Meanwhile, the significance value of the two-tailed (2-tailed) test was 0.009 < 0.05. Thus, it can be concluded that the mean scores of the two groups differ significantly. Similar results were shown in the large group trial, which showed that the average student pretest result was smaller than the post-test mean (36.882 < 41.69), with a difference of 43.14 between the two scores. Meanwhile, the paired sample t-test showed a t-value of -13.034 with 8 degrees of freedom. Meanwhile, the significance value of the two-tailed (2-tailed) test was 0.000 < 0.05. Thus, it can be concluded that the mean scores of the two groups differ significantly.
- b. The information literacy-based inquiry learning model developed through research and development is feasible to be implemented as a learning model in the TQM course at the STIE Anandra Jakarta management study program. First, the characteristics of the appropriate students are all digital natives, and are already familiar with digital devices, Second, based on the results of small group trials and large group trials, both students and lecturers assessed that learning materials developed through research and development had good interest in aspects of attracting attention, relevance, self-confidence, and satisfaction.

Discussion

Power of the Model

This information literacy-based inquiry learning model has several strengths, including:

- a. The information literacy-based inquiry learning model developed with this research is relevant to the characteristics of the learning process in higher education, which consists of interactive, holistic, integrative, scientific, contextual, thematic, effective, collaborative, and student-centered characteristics. Inquiry learning has received much attention from researchers and education practitioners because most of it focuses on the active involvement of students in learning through discovery, as well as encouraging independent learning through observation and exploration. and the experimentation of Lappas, P. Z., & Kritikos, M. N. (2018). In addition, because its ability is equipped with steps that encourage students to synthesize information and generate completely new knowledge through the research process, the inquiry learning model is a strong learner-centered pedagogical approach widely used at all levels of education. (Liu et al., 2019).
- b. The inquiry learning model based on information literacy is relevant to the characteristics of students in the 21st century whose daily life cannot be separated from digital devices used for various needs. Information needs and skills to identify and access information effectively, efficiently, ethically, and legally. This ability is referred to as information literacy skills or knowledge of information (Harsiati, T., Pradana, I. M., & Amrullah, H. (2019). Information literacy and self-regulation in the context of the creative thinking of prospective engineers. *World Transactions on Engineering and Technology Education*, 17(2), 197-203.). In addition, the rapid development of digital tools, where the digitization of almost all services, information, and analog options are removed. The digitalization of society certainly affects everyone and imposes great demands on all citizens to truly participate and become active citizens in an increasingly digital community by understanding how media, digital services, and technology can be used in everyday life. Based on the various needs of individual citizens. Therefore, integrating information literacy into learning is much bigger than just teaching students how to use software or digital technology (Becker, 2018).
- c. The information literacy-based inquiry learning model can be implemented in a learning setting that combines face-to-face and online learning (blended learning) or in a fully online setting. The flexibility of this model makes it a student-centered learning model that is still suitable for use in various situations. In addition, the learning stages that combine three approaches at once and are supported by the integration of information and communication technology and digital tools make this learning model suitable for learning the generation of digital natives.

Weaknesses of the Model

The weaknesses of this information literacy-based inquiry learning model are as follows:

- a. Although it is designed to be carried out in a blended learning method as well as in full online (fully online), the prolonged Covid-19 pandemic forced the institution where the research was carried out to carry out full online learning so that the implementation of the developed model was only piloted in a setting. Full network learning, both in small group trials and field trials. Therefore, on another occasion, the effectiveness of this learning model needs to be tested in a blended learning setting.
- b. As a learning model that relies on technology and digital tools as a medium of communication, both between lecturers and students or between students, the condition of the internet network is often unstable, and the availability of internet access is often limited, causing some stages of learning to be less than optimal, especially at the investigative stage where students need adequate internet access to access and search for information online. As an anticipatory step, the learning schedule must be arranged as flexibly as possible according to students' readiness, especially related to the availability of internet access.
- c. The inquiry learning model based on information literacy requires both lecturers and students to have certain appropriate digital tools in terms of networks, storage media, and completeness of features. Therefore, before implementing this model, teachers need to identify the readiness of

teachers themselves and students related to the willingness of digital tools and supporting competencies required to participate in learning effectively. As an anticipatory step, lecturers must train students at the beginning of the lecture, especially in operating digital tools and applications needed during learning.

Supporting and Inhibiting Factors of Research and development

Some of the supporting and inhibiting factors in this research and development process, among others, are as follows:

a. Supporting Factors

The factors that support the success of this research and development include: 1) the involvement of students with digital tools in their daily lives makes it easier for students to adapt to the online learning process, which is carried out fully using digital tools; 2) good cooperation and full support from the leadership of STIE Trianandra, especially in granting permission and access to information that researchers need, persistence and motivation of students to provide positive responses in providing data and information; 3) high student motivation to be actively involved in research activities, especially at the small group trial stage and field test. Besides being considered a new model that increases knowledge, students understand that the application of this model will be able to accommodate their habits of interacting with the internet and digital tools.

b. Inhibiting Factor

The inhibiting factors in this research and development are as follows: 1) this model requires the use of proper digital tools and adequate internet access. Limited digital devices and internet access can hinder the effective implementation of this model; 2) Although the internet and digital tools have become an inseparable part of daily student life, information literacy skills are not only limited to the ability to access and operate digital tools. Moreover, information literacy skills are related to the use of internet technology effectively, efficiently, ethically, and legally. Therefore, teacher guidance is needed on aspects of information literacy in the learning process. 3) The prolonged Covid-19 pandemic makes it difficult for researchers to participate in the research process, especially in searching for physical data that requires researchers to meet face-to-face. This causes the research process to take longer than it should.

Based on the description above, it can be concluded that the success of the research process and the development of an information literacy-based inquiry learning model is due to the support and active participation of various parties in the entire series of research stages.

Conclusion

The information literacy-based inquiry learning model developed through research and development has proven to improve learning outcomes and information literacy skills of students majoring in management at STIE Trianandra Jakarta. This is evidenced by the results of small group trials which show the average student pretest results are smaller than the average post-test results (36.33, < 41.69), with the difference in the value of the two is 5.36. b. The information literacy-based inquiry learning model developed through research and development is feasible to be implemented as a learning model in the TQM course at the STIE Anandra Jakarta management study program. First, the characteristics of the appropriate students are all digital natives, and are already familiar with digital devices, Second, based on the results of small trials and large group trials, both students and lecturers assessed that the learning group materials developed through research and development had good interest in the aspects of attracting attention, relevance, self-confidence, and satisfaction.

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