The Correlation Between e-Health Literacy Competencies and Self-management of COVID-19 Disease
(Case Study of Health Information Managements Students in Semarang)

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Abstract. Introduction: Mass open communication via social media and the internet causes infodemics and information gaps. The COVID-19 pandemic has become a driving force in global adoption of digital technology such as the internet, including in Indonesia. Individuals need eHealth literacy to assess the information they are overwhelmed with critically. This study is the first paper exploring eHealth literacy related to self-management COVID-19. **Method:** This study used a case study approach. An online questionnaire was distributed to health information management (HIM) vocational students of Universitas Dian Nuswantoro and got 245 responses. The questionnaire was constructed and modified from eHeals and Corona Virus disease advice for the public from WHO. **Result:** This study reveals that competency in evaluation information is the lowest score than competencies in access, managing, and integrating health information. This study found that eHealth literacy related to self-management COVID-19 (r = 2.69, p = 0.000) means competencies managing health information in HIM students relate to knowledge, attitude, and practice COVID-19. **Discussion:** This study found that 6.5% of HIM's students still believe in conspiracy theory and politics; furthermore, 71.4% are still unsure how to respond to this issue. Future research needs to be conducted to explore eHealth literacy and Self-management COVID-19 in the community and compare them with this study.

Keywords: COVID-19 · Deception · Digital health literacy · eHealth literacy · Self-Management

1 Introduction

Technologies have helped human beings transform routines differently, which has also directly impacted the health sector in how people approach health, how patients interact with health professionals, and how people access and receive health care at various levels of care. Furthermore, developing wireless technology wireless technologies creates opportunities to revolutionize the health sector. Wireless technology could solve

geographic access problems, facilitate the provision of appropriate interventions, reduce intervention costs, and even help raise public awareness of approaching health problems and promoting healthy lifestyles contributing to patient empowerment [1].

Pandemic Coronavirus Disease (COVID-19) has been speeding up digital transformation in every sector because digital technologies have become a problem solving and a significant route for accessing remote services during the COVID-19 crisis. Human behavior is slowly changing as a result of digital transformation; digital development has already reached Digital Industry 4.0 and is still progressing toward Society 5.0 [2, 3]. Automation is at the heart of Digital Industry 4.0. At the same time, Society 5.0 will be a collaboration between humans and autonomous machines to maximize the use of human brainpower and creativity by merging workflows with intelligent systems [4].

Digital technology herald a major shift in how health and medical information is delivered, with the potential to convey knowledge from health professionals to the general population. This transfer will empower individuals in maintaining and improving their health while also bridging the power and communication divide that exists between health experts and the general public. However, digitalization in human life has the potential to have a detrimental impact, in addition to making life easier to manage. There is a risk of injury due to the prevalence of false and misleading information on the Internet. Aside from information that is incomplete or based on insufficient scientific evidence, there is also the possibility of fraudulent or misleading information [5].

The widespread dissemination of information via social media and the internet causes infodemics and frequently results in incorrect information [6, 7]. Infodemic defines as "an overabundance of information – some accurate and some not – that makes it hard for people to find trustworthy sources and reliable guidance when they need it". Misinformation is defined as "deliberately misleading or inaccurate information meant to deceive" [8]. Both of them should be fought to have a negative impact on health status through health literacy, particularly eHealth literacy [7, 9–11].

COVID-19 becomes reinforcing factors to penetrate digital technology, especially the internet, in every country globally, including Indonesia. COVID-19 is the new term in human life and creates anxiety, fear, depression, and drives irrational thinking and makes the exploding market of COVID-19 facts and fiction [12, 13]. It's because scientific knowledge about COVID-19 requires time to establish and prove. In these scenarios, the public's capacity to understand what health authorities and politicians say or try to describe presents a variety of challenges [14]. Individuals require eHealth literacy to critically assess the information with which they are bombarded because the influential role of digital media, particularly online social media, facilitates and fosters misinformation about health and science. Social media blurs the distinction between what is good and bad, scientific and unscientific, and true and false [15].

Indonesia has a 71.1% internet penetration rate but poor digital literacy skills (52 of 62 countries globally). According to the data, Indonesia has a clear disadvantage when it comes to using digital technology, and it is very easy to negatively impact digital technology through misinformation and hoax. Indonesia had experiences facing Infodemic during the election and COVID-19 diseases [16–18]. Recent studies still explored various misinformation in public, but limited studies describe individual factors such as eHealth literacy-related practice in preventing COVID-19.

This study is the first study that explores eHealth literacy concerning self-management COVID-19. The case study took health information management (HIM) vocational students. The eHealth literacy indicators describe access, management, integration, and evaluation of health information on the internet. In contrast, self-management describes knowledge, attitude and practice in COVID-19 prevention.

2   Methods

This is a case study of a vocational group health information management student at Universitas Dian Nuswantoro. An online survey was used to distribute a questionnaire in this study. To collect data, the online survey link was distributed via online social networks and class group chat, as well as snowball sampling among group members. Respondents who completed the survey received souvenirs.

With the limitation of the online survey, this study gets 245 responses from 883 of all the students (27.7%) consisting of the first, third and fifth semester. This study approved by Ethical Research Committee from Semarang State University No. 172/KEPK/EC/2020.

The questionnaire was constructed and modified from eHeals (eHealth literacy scale) and Corona Virus Disease advice for the public from WHO [19–21]. This study used JASP (Jeffreys's Amazing Statistics Program) to analyze data [22].

3   Results

3.1   e-Health Literacy Competencies

This study measured eHealth literacy competencies using a modification of the eHeals questionnaire in response to the questions. The answers describe the level of autonomy of respondents to handle health information. The level of autonomy such as 0: cannot; 1: very difficult and need assistance; 2: difficult and need assistant; 3: easy need assistances; 4: easy without assistances; 5: easy can help others; 6: very easy if do not have problems; 7: very easy and can solve problems error. eHealth literacy competencies measured competencies in access, manage, integrate and evaluate health information consist of eight questions.

Except for the technical competencies to find information on the internet, Table 1 shows that students still require assistance to access, manage, integrate, and evaluate health information on the internet (0.8%). In 10% of students, the competencies for integrating and assessing health information found on the internet are still challenging.

The highest level of competencies (7 = very easy and can solve the problems) laid in the competencies what (22%), where (24.5%) and how (31%) to find health information on the internet (Table 1).

Table 2 shows that the students have the highest mean of competencies score ($\bar{x}$ = 5.77) in the knowledge of internet as a health information source. Still, unfortunately, the score for distinguishing the validity of information on the internet is the lowest ($\bar{x}$ = 4.33). This study explored that student competencies in e-health literacy sorted the highest to the lowest are manage, access, integrate, and evaluate health information (Table 2).

Table 1. eHealth Literacy Competencies of Health Information Management Students of Universitas Dian Nuswantoro.

Statement	f	%
HEALTH INFORMATION ACCESS		
Know what kind of health information can be found on the internet.		
can not	0	0
very difficult and need assistance	0	0
difficult and need assistant	4	1.6
easy need assistances;	44	18.0
easy without assistance	0	0
easy can help others	51	20.8
very easy if do not have problems	92	37.6
very easy and can solve problems error.	54	22.0
Know where can find useful health information on the internet		
can not	0	0
very difficult and need assistance	0	0
difficult and need assistant	3	1.2
easy need assistances;	53	21.6
easy without assistance	0	0
easy can help others	48	19.0
very easy if do not have problems	81	33.1
very easy and can solve problems error.	60	24.5
HEALTH INFORMATION MANAGE		
Know that the internet can be used as a health information resources		
can not	0	0
very difficult and need assistance	0	0
difficult and need assistant	2	0.8
easy need assistances;	25	10.2
easy without assistance	25	10.2
easy can help others	50	20.4
very easy if do not have problems	92	37.6
very easy and can solve problems error.	76	31.0
Know how to find useful health information on the internet		
can not	0	0
very difficult and need assistance	0	0

Table 1. (*continued*)

Statement	f	%
difficult and need assistant	0	0
easy need assistances;	2	0.8
easy without assistance	49	20.0
easy can help others	49	20.0
very easy if do not have problems	88	35.9
very easy and can solve problems error.	0	0
HEALTH INFORMATION INTEGRATE		
Know how to use the internet to answer questions about health		
can not	0	0
very difficult and need assistance	0	0
difficult and need assistant	9	3.7
easy need assistances;	49	20.0
easy without assistance	0	0
easy can help others	49	20.0
very easy if do not have problems	88	35.9
very easy and can solve problems error.	50	20.4
Know how to use health information that had been found to help my daily task		
can not	0	0
very difficult and need assistance	1	0.4
difficult and need assistant	17	6.9
easy need assistances;	65	26.5
easy without assistance	0	0
easy can help others	47	19.2
very easy if do not have problems	76	31.0
very easy and can solve problems error.	39	15.9
HEALTH INFORMATION EVALUATION		
Can evaluate health information found on the internet		
can not	0	0
very difficult and need assistance	1	0.4
difficult and need assistant	14	5.7
easy need assistances;	78	31.8
easy without assistance	0	0

Table 1. (*continued*)

Statement	f	%
easy can help others	44	18.0
very easy if do not have problems	79	32.2
very easy and can solve problems error.	29	11.8
Can differentiate between correct and incorrect health information found via the internet		
can not	2	0.8
very difficult and need assistance	5	2.0
difficult and need assistant	35	14.3
easy need assistances;	80	32.7
easy without assistance	0	0
easy can help others	30	12.2
very easy if do not have problems	53	21.6
very easy and can solve problems error.	40	16.3

Table 2. Descriptive Statistic of eHealth Literacy Competencies of Health Information Management Students of Universitas Dian Nuswantoro.

Statement	Min	Max	Mean	SD
Know what kind of health information can be found on the internet.	2.00	7.00	5.40	1.40
Know where can find useful health information on the internet	2.00	7.00	5.35	1.47
Know that the internet can be used as a health information resources	2.00	7.00	5.77	1.23
Know how to find useful health information on the internet	2.00	7.00	5.64	1.30
Know how to use the internet to answer questions about health	2.00	7.00	5.26	1.49
Know how to use health information that had been found to help my daily task	1.00	7.00	4.87	1.64
Can evaluate health information found on the internet	1.00	7.00	4.73	1.60
Can differentiate between correct and incorrect health information found via the internet	0.00	7.00	4.33	1.88

3.2 Self Management Covid 19 – Knowledge

This study explored the COVID-19 Pandemic Response through self-management. COVID-19 consist of the knowledge, attitude and practice of respondents. Table 3 shows the perception of respondents likely in the excellent state both in positive and negative statements. Most of the respondents have known the transmission ($\geq 75\%$) and symptom

Table 3. Self-management of Covid-19 Disease on Health Information Management Students (Knowledge).

Self-Management	Answer	F	%
KNOWLEDGE			
COVID-19 could infect everyone include me	SD	5	2.0
	D	0	0.0
	N	50	20.4
	A	96	39.2
	S A	94	38.4
COVID-19 could be transmitted through touch things infected by virus			
Touching patients	SD	1	0.4
	D	0	0.0
	N	62	25.4
	A	113	46.1
	S A	69	28.2
Touching an item someone else touched	SD	2	0.8
	D	0	0.0
	N	70	28.6
	A	120	49.0
	S A	53	21.6
Face to face talking	SD	0	0.0
	D	0	0.0
	N	46	18.8
	A	119	48.6
	S A	80	32.7
Handshake or hugs	SD	2	0.8
	D	0	0.0
	N	24	9.8
	A	123	50.2
	S A	96	39.2
Sharing and eating from the same dish	SD	0	0.0
	D	0	0.0
	N	35	14.3
	A	128	52.2
	S A	82	33.5

(*continued*)

Table 3. (*continued*)

Self-Management	Answer	F	%
COVID-19 only infected elderly person	SD	65	26.5
	D	0	0.0
	N	144	58.8
	A	20	8.2
	S A	16	6.5
COVID-19 only dangerous for person with comorbid disease	SD	31	12.7
	D	0	0.0
	N	153	62.4
	A	47	19.2
	S A	14	5.7
Person with no symptom of COVID-19 is safe	SD	24	9.8
	D	0	0.0
	N	191	7.8
	A	21	8.6
	S A	9	3.7
I will safe from COVID-19 if using mask, routine had wash and make distance with another person	SD	1	0.4
	D	0	0.0
	N	40	16.3
	A	101	41.2
	S A	103	4.2
The main clinical symptom of Covid-19 are			
fever	SD	0	0.0
	D	0	0.0
	N	87	35.5
	A	132	53.9
	S A	26	10.6
fatigue	SD	0	0.0
	D	0	0.0
	N	156	63.7
	A	73	29.8
	S A	16	6.5

(*continued*)

Table 3. (*continued*)

Self-Management	Answer	F	%
dry cough	SD	1	0.4
	D	0	0.0
	N	101	41.2
	A	116	47.3
	S A	27	11.0
runny nose	SD	2	0.8
	D	0	0.0
	N	130	53.1
	A	92	37.6
	S A	21	8.6
sneezing	SD	4	1.6
	D	0	0.0
	N	158	64.5
	A	66	26.9
	S A	17	6.9
dyspnea	SD	1	0.4
	D	0	0.0
	N	62	25.3
	A	138	56.3
	S A	44	18.0
loss of taste and smell	SD	2	0.8
	D	0	0.0
	N	71	29.0
	A	113	46.1
	S A	59	24.1

SD (Strongly Disagree); D (Disagree); N (Neutral), A (Agree), SA (Strongly Agree)

of COVID-19 diseases such as fever, fatigue, dry cough, runny nose, sneezing, dyspnea, loss of taste and smell. Some respondents ($\geq$50%) are still unsure about fatigue symptoms, runny nose, and sneezing related to COVID-19 diseases.

Table 4. Self-management of Covid-19 Disease on Health Information Management Students (Attitude).

Self-Management	Answer	F	%
ATTITUDE			
I confidence that I will not be affected by COVID-19 because I am healthy	SD	13	5.3
	D	0	0.0
	N	121	49.4
	A	47	19.2
	S A	64	26.1
I believe every individual have a part to prevent the transmission of COVID-19	SD	0	0.0
	D	0	0.0
	N	129	52.7
	A	116	47.3
	S A	0	0.0
I believe COVID-19 related with politics and conspiracy	SD	16	6.5
	D	0	0.0
	N	175	71.4
	A	25	10.2
	S A	29	11.8

SD (Strongly Disagree); D (Disagree); N (Neutral), A (Agree), SA (Strongly Agree)

3.3   Self Management Covid 19 – Attitude

Table 4 reveals that 71.4% of respondents still have no opinion-related statements that COVID-19 diseases related to politics and conspiracy, but unfortunately, 6.5% of respondents agree with the statements. Related to the attitude, 5.3% of respondents believe that they will not be affected by COVID-19 disease.

3.4   Self Management Covid 19 – Practice

Practices of prevention COVID-19 still have problems, students rarely and never to avoid touching nose, mouth and eyes (29%), to clean and disinfectant surfaces (28.2%) and keep to update information related covid (32.7%) (Table 5).

Table 5. Self-management of Covid-19 Disease on Health Information Management Students (Practice).

Self-Management	Statements	F	%
PRACTICE			
Avoid the 3Cs: spaces that are closed, crowded or involve close contact.	Always	92	37.6
	Almost everyday	43	17.6
	Often	84	34.3
	Rarely	23	9.4
	Never	3	1.2
Regularly and thoroughly clean your hands with an alcohol-based hand rub or wash them with soap and water	Always	143	58.4
	Almost everyday	27	11.0
	Often	64	26.1
	Rarely	11	4.5
	Never	0	0.0
Avoid touching your eyes, nose and mouth	Always	63	25.7
	Almost everyday	16	6.5
	Often	95	38.8
	Rarely	63	25.7
	Never	8	3.3
Cover your mouth and nose with your bent elbow or tissue when you cough or sneeze	Always	105	42.9
	Almost everyday	19	7.8
	Often	90	36.7
	Rarely	26	10.6
	Never	5	2.0
Clean and disinfect surfaces frequently especially those which are regularly touched,	Always	62	25.3
	Almost everyday	16	6.5
	Often	98	40.0
	Rarely	56	22.9
	Never	13	5.3
Even whether you have mild symptoms including a cough, headache, or a mild fever, you prefer to stay at home and detach yourself until you recover.	Always	101	41.2
	Almost everyday	20	8.2
	Often	73	29.8
	Rarely	36	14.7
	Never	15	6.1

(*continued*)

Table 5. (*continued*)

Self-Management	Statements	F	%
Maintain current information of the most specific updates from reputable sources, such as the WHO or your local and national health authorities.	Always	56	22.9
	Almost everyday	20	8.2
	Often	89	36.3
	Rarely	69	28.2
	Never	11	4.5

Correlation eHealth literacy and self-management COVID-19 (Sign 0.000, r = 2.69).

4 Discussion

In the network era, eHealth literacy has recently become a necessary ability. eHealth literacy is described as the ability to seek, find, comprehend, and appraise health information from electronic sources, particularly the internet, and how that ability can be used to treat or solve a health condition. eHealth literacy, also known as digital health literacy, is a new face of health literacy that has been linked to health status and behavior in the digital age. During the COVID-19 pandemics, eHealth literacy have been realized as the solution to oppose Infodemic in COVID-19 [7, 14].

This paper is the first study that describes eHealth literacy status-related COVID-19 in Indonesia. The case study conducted on vocational health information students. Students of health information management major hopefully have eHealth literacy skills above average in the population. This study reveals that competency in evaluation information is the lowest score than competencies in access, managing and integrating health information. Others study also found the same result in high school students: they have difficulties evaluating the right and trusted health information. The skill to evaluate information make people could filter irrational information and Infodemic [7].

Misinformation and infodemic of COVID-19, such as conspiracy theory, religious issue, non-scientific medication, have been proven related to individual response in COVID-19. This study found that 6.5% of HIM students still believe in conspiracy theory and politics; 71.4% are still unsure how to respond to this issue. It should be a concern because the student of health information major is a group that should be more literate in health information. It should be explored more how these facts in public. This study found that eHealth literacy related to self-management COVID-19 (r = 2.69, p = 0.000) means competencies managing health information in HIM students relate to knowledge, attitude, and practice COVID-19. The global fight against the COVID-19 Infodemic should be treated as a scientific discipline because it reveals that behaviour change is critical in each pandemic response.

This study found that 45.3% of students confident that they will not be affected by COVID-19 while risk perception toward COVID-19 pandemic is related to individual health behaviours. The result of this study shows that the best practices for prevention COVID-19 that have been done are avoid 3Cs (closed, crowded, and avoid close contact) and regularly clean hands with alcohol, soap and water. Another study related

health belief model in COVID-19 also found that 60.7% of confident in avoiding infections. Health Belief Model is the conceptual model that often explains prevention health behaviours.

5   Conclusion

eHealth literacy has recently become an essential skill in the network era. This paper is the first study that describes eHealth literacy status-related COVID-19 in Indonesia. This study found that eHealth literacy is related to self-management COVID-19 (knowledge, attitude and practice of COVID-19). This study reveals that competency in evaluating health information is the lowest compared to competencies in access, manage and integrating health information. The skill to evaluate information make people could filter irrational information and Infodemic. Students still believe misinformation related to COVID-19 and the fact still distribute where they should have the best practices preventing COVID-19 into practice. Future research needs to conduct and to explore eHealth literacy and Self-management COVID-19 in the community and compare them with this study.

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