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Development of Cognitive Instruments in Epidemiology Using Asyncronous Methods

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ABSTRACT   : The purpose of this research is to find out the development of cognitive instruments for community empowerment in the field of epidemiology using the asynchronous method. This research method uses a quantitative descriptive method. The results of the study found that learning using asynchronous e-learning was inappropriate for students with low cognitive levels. So that before learning, a pre-test was carried out, from the results of filling in the items it could be seen that the cognitive level of students was high, low or medium. For high cognitive levels, it can still be given. But for moderate or low cognitive levels, it is necessary to do a good learning design, so that these students can follow well the entire learning process. Conclusion of this study From the results of several research results, it can be concluded that learning using asyncronous e learning is less effective, especially students' low cognitive levels. Requires psychological support from the environment. because there is no direct interaction, so that between students do not know each other. especially the support from the tutor/teacher. Students learn according to their respective work settings, so that they learn independently. It is necessary to do a mature design before the learning begins. So that learning can have a good impact, namely being able to improve the performance of the learner.

KEYWORDS: *Cognitive development, instruments, asynchronous*

I.   INTRODUCTION

With the development of increasingly high technology, we are all forced to be able to keep up. In this digital era, everything is digital in all fields. Not only in the office or world of work, wherever everything is done now is all digital. dealing with computers or laptops or cellphones every day. Even in the shopping world, starting from buying clothes, boards and food, it is done digitally. We all go anywhere, we can use any vehicle, whether it's a 4- wheeled vehicle or a 2-wheeled vehicle. For example, crab cars, gojeg and so on. Likewise in the world of training. In the world of training, there are many learning methods, both real-world learning or what is often called a classical meeting. Or in cyberspace, which is often called synchronous and asynchronous learning. Student or student synchronous learning, you can still see the instructor on zoom or via YouTube. But asynchronous learning is even more complex. Where the learning system is carried out independently, using a learning management system. For example using MOOC. The success of the learner depends on the awareness and willingness of the learner himself. If you want, you can follow the lesson, but if not, the participant will not get the knowledge he expects, dropping halfway. Therefore, it is not appropriate if asynchronous learning is a simulation or practice method. Unless the learning is done in blended learning. Some learning is online (synchronous and asynchronous), and some is done offline or face to face. Then the purpose of learning to do or simulation or practice can be done. Obstacles in the field When learning is zoomed in, many participants are doing other activities. so that the   participants were not focused. Moreover, asynchronous learning or independent learning. It all depends on the participants. If you need knowledge, you will continue, if you don't usually stop halfway. Learning is the core and estuary of the entire process of managing education. The quality of an educational institution is essentially measured by the quality of the learning process. Besides the output and outcome or product produced. Therefore, the criteria for quality and success of learning should be made in detail, so that they can really be measured and observed. Eddie Elisa(2021)

GENERAL PURPOSE
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SPECIAL PURPOSE

Knowing the Cognitive Development Instrument Lattice, conducting validity and reliability tests, knowing the true and false points in the cognitive domain instrument development, knowing the different test in the cognitive domain instrument development, Knowing the cognitive domain grouping and knowing the level of difficulty test in the cognitive domain.

II.   RESEARCH METHODS

The research method is carried out in a quantitative descriptive manner, what is meant by quantitative research according to (Creswell, 2017) is: "testing a theory by detailing specific hypotheses, then collecting data to support or refute these hypotheses. while   what is meant by descriptive statistics according to (Sugiyono, 2011) are: "statistics used to analyze data by describing or describing the data that has been collected as it is without intending to make general conclusions or generalizations. The study population consisted of health center officers with surveillance professional backgrounds, doctors, midwives and nurses. the number of respondents was 30 people. What is meant by population according to (Sugiyono, 2011) is: "generalization area consisting of objects/subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions. While the sample according to (Sugiyono, 2011) is: "part of the number and characteristics possessed by the population. Meanwhile, what is meant by a sample according to Sugiyono (2011), is part of the number and characteristics possessed by the population. The time of the research was carried out for 3 days, from 13-18 March 2023, while the research location was at the Ciloto Health Training Center. Data collection techniques using primary data, where researchers use instruments by searching for data through questionnaires. given 21 questions cognitive domain. While the data analysis technique uses SPSS 25.

RESEARCH RESULT

TABLE 1 :GRIDS OF INSTRUMENTS REQUIRED FOR MEASURING COMMUNITY EMPOWERMENT IN THE FIELD OF EPIDEMIOLOGY IN FUNDAMENTAL EPIDEMIOLOGY TRAINING

VARIABEL PENELITIAN	INDIKATOR	NO. ITEM INSTRUMEN
Epidemiology concept	Definition of Epidemiology	1
community empowerment	Community empowerment in the field of epidemiology	2,3,4,5,6
Epidemiological Surveillance	1. Epidemiological Surveillance 2. Community-based surveillance	7,8,9
individual empowerment	1. The concept of empowerment 2. Advocacy 3. Lobby 4. Participation 5. Persuasion	10, 11,12,13,14, 15, 16,17
Empowerment Steps	1. The concept of empowerment 2. Advocacy 3. Lobby 4. Participation 5. Persuasion	18
Health Promotion	1. Health Promotion	19
Implementation steps	1. community development/assistance 2. Coordination or technical orientation	20
Mass media	1. Mass media	21

TABLE 2 :TEST THE VALIDITY AND RELIABILITY TEST OF THE   RESEARCH INSTRUMENT
Case Processing Summary

Cases	N	%	%
	Valid	30	100.0
	Excluded[a]	.0	.0
	Total	30	100.0

 Listwise deletion based on all variables in the procedure.

This first output describes the amount of valid data to be processed and the data issued and the percentage. It can be seen that there are 10 valid data or cases with a percentage of 100% and no data is excluded.

TABLE 3 :DECISION VALIDITY

No	r hitung	r Kritis	Keputusan
r1y	0,827	0,3	Valid
r2y	0,31	0,3	Valid
r3y	0,33	0,3	Valid
r4y	0,861	0,3	Valid
r5y	0,33	0,3	Valid
r6y	0,626	0,3	Valid
r7y	0,33	0,3	Valid
r8y	0,626	0,3	Valid
r9y	0,43	0,3	Valid
r10y	0,861	0,3	Valid
r11y	0,724	0,3	Valid
r12y	0,350	0,3	Valid
r13y	0,35	0,3	Valid
r14y	0.591	0,3	Valid
r15y	0,456	0,3	Valid
r16y	0,724	0,3	Valid
r17y	0,35	0,3	Valid
r18y	0,31	0,3	Valid
r19y	0,591	0,3	Valid
r20y	0,466	0,3	Valid
R21y	0,724	0,3	Valid

TABLE 4 : RELIABILITY STATISTIK

Reliability Statistik	
Cronbach's Alpha	N of Items
0,61	21

This second output is the result of a reliability analysis using the Cronbach Alpha technique. It can be seen that the Cronbah Alpha value is 0.623. According to Sekaran (1992) in Duwi Priyatno (2018), reliability of less than 0.6 is not good, while 0.7 is acceptable and above 0.8 is good. The value is more than 0.6, so the results are reliable and the number of items (N) is 21, none of which are repaired or discarded.

TABLE 5 : RESULTS ITEM COUNT CORRECT AND ITEM COUNT INCORRECT
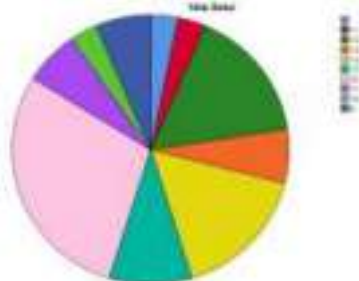
Based on table 5 processed results using SPSS 25, the difference from the pie chart is illustrated, the value between the correct and incorrect items

TABLE 6 : DIFFERENT TEST CRITERIA

Kriteria	Sum	explanation	%
Very well	1	≥ 85	3,3
Good	14	71-80	46,7
Enough	7	60-70	23,3
Bad	6	51-59	28,6
Ugly	2	≤50	6,7
Sum	30		100

The results of the different test showed that the criteria for very good were 1 (3.3%), and very bad were 2 (6.7%). The biggest value lies in the good criteria with a value range of .71-80%, namely 46.7%.

TABLE 7 : RESULTS OF BLOOM'S TAXONOMY COGNITIVE REALM CLASSIFICATION

Cognitive Realm Levels	Community Empowerment Variable in the Field of Epidemiology	Number of Questions
Remember (C1)	1,3,7,8,15,17	6
Understanding (C2)	2,4,6,10,11,12,14,16,18,19,20,21	12
Apply (C3)	9	1
Analyze (C4)	-	-
Evaluate(C5)	13	1
Create (C6)	-	-
Sum		21

Results of Bloom's taxonomy cognitive domain levels in this study consisted of C1: 2 questions, C2: 4 questions, and C3: 4 questions. The cognitive domain of the questions, including level 1 and level 2 and level 3, is at the stage of knowledge and knowing, understanding and applying.

TABLE 8 : DIFFICULTY LEVEL TEST

Problem Difficulty Level	Difficullt	Moderate	Easy	Jumlah
Community Empowerment in the Field of Epidemiology	6,7 %	46,7 %	3,3 %	100%

Based on the manual calculation of incorrect and correct items, the highest score was obtained, namely 1 (3.3%) easy question, the smallest value, which was obtained on difficult questions, namely 2 (6.7%).

III. DISCUSSION

Development of this cognitive instrument by making items with a cognitive domain. where in this cognitive domain 21 questions were made. The first step is to make a grid first. In order to evenly distribute the expected competencies. Next, ask questions. In order to find out whether the item can be used or not, the item is distributed to 30 people to be filled in by the respondent. Where the respondents were puskesmas officers who carried out epidemiological community empowerment at their workplace and alumni who participated in fundamental epidemiology training. Of the 21 questions, the items were scored and all were stated to be applicable, because nothing was too difficult and nothing was too easy. Furthermore, these items were tested for validity and reliability tests using the SPSS 25 application. These items were declared valid and reliable. Already able to measure what should be measured and declared steady or consistent. So that it can be used for asynchronous learning processes in fundamental epidemiology training. The results of the different test criteria, the highest value is good and the lowest value is very bad and the value is good. Meanwhile, the difficulty level test is included in the moderate category. Not too easy and not too difficult. It is possible that theories related to epidemiology in theory should not be asked, although in practice it is carried out in the field, especially for field workers at the Puskesmas, including surveillance, doctors, nurses and midwives. Going to the field is their routine task.

Based on the results of observations of the implementation of participants who were trained in fundamental epidemiology training, most of the participants were familiar with asynchronous learning, including using MOOC, LMS and many other types of models. Participants are used to working in front of a laptop or computer. The main thing is that participants must have a commitment to independent study in the MOOC program or other programs. Read modules and material in the form of PowerPoint or in the form of word given. Participants are also given a video, so that the theory given is illustrated by the participants. It is also endeavored that this MOOC is made communicative by the teaching tutor for each material. So that the participants feel the presence of the tutor among the participants. Although in reality tutors and participants have their own activities. Because participants are given time, they are free to use that time at any time, the important thing is that all of the material has been read in full. So that when the final evaluation, can work on the items properly. So that trainees can take part in this training until they pass and get a certificate.

Baruck's research (2008) states that there are differences between distance learning and classroom learning. Learning interactions between teachers and students are the main factors that mutually influence the effectiveness of the process. Different interactions will have different effects. Because this is an interaction of the cognitive domain, the variables of student achievement and learning satisfaction influence between these students getting learning between synchronous and asynchronous. Based on the results of observations and interviews, research helps clarify that the interaction of teachers and students influences the success of the learning. shows that the teacher student interaction that accompanies the learning process is very important for all students. However, students with higher-order thinking can overcome the low-level interactions in asynchronous learning. The results of the study show that synchronous learning is more effective when it is carried out by students who have high cognitive abilities. For students who have low cognitive abilities, psychologically, it will make communication between teachers and students not good so that misunderstandings can occur. (Baruch Offir, 2008).

This study describes learning to see the effects of profiles using different technologies in terms of educational experiences in community inquiry. Where in situations students participate in discussions in learning with high-level cognitive using asynchronous online methods. Through grouping students (N = 81) in a postgraduate distance education engineering course, six distinct profiles were identified namely: 1) task-focused users, 2) non-content-focused users, 3) no users, 4) users who very intensive , 5) content-focused intensive users, and 6) social-focused intensive users. The six groups had different cognitive levels, with multivariate large effect sizes of 0.54 and 0.19 η2, respectively. In connection with different student profiles, associated with higher levels of cognitive presence, the results of this study indicate various ways for students to succeed in inquiry communities, namely with instructional support psychological interventions in the use of different

technologies (Vitomir Kovanović, 2015).

The purpose of this research is to develop and validate a self-report instrument that can be used to measure learning in the cognitive, affective, and psychomotor domains. This study underwent three phases, each with its own data collection and analysis. Phase I featured the development, testing, and factor analysis of 80 instrument items discussing cognitive, affective, and psychomotor learning given to 142 samples of online and face-to-face learners. Based on these results, the instrument was reduced to 21 items for Phase II and tested with a new sample of 171 online and face-to-face students. The results of the confirmatory factor analysis showed a better fit of the data with an even smaller 9-item instrument, which was then administered to a new sample of 221 online and face-to-face students in Stage III. The results of this final stage are presented together with the resulting CAP Perceived Learning Scale, a 9-item self-report measure of perceived cognitive, affective, and psychomotor learning. The implications and use of the CAP's Perceived Learning Scale for research and practice are also discussed. (Alfred P. Rovai, 2009)

Research in the field of Computer Supported Collaborative Learning (CSCL) is based on a variety of methodologies. In this paper, we focus on content analysis, which is a technique often used to analyze transcripts of asynchronous computer-mediated discussion groups in formal educational settings. Although this research technique is frequently used, standards have not been established. The instruments used reflect a wide variety of approaches and differ in the level of detail and the types of categories of analysis used. Further differences relate to the diversity in their theoretical bases, the amount of information about validity and reliability, and the choice of units of analysis. (B. De Wever, 2006) The learning environment using technology (TELE) is designed for independent learning, so that students have confidence in complex learning environments, while teachers can guide students in carrying out learning using this technology, so that it can affect student achievement. This research addresses the potential importance of designing scaffolds in TELE that intentionally promote academic self-efficacy. It is recommended to design asynchronous Audio/Visual tools into TELE to increase students' self-efficacy so that their performance can increase... (Anthony J. Girasoli, 2008).
The current learning environment states that e-learning has not measured student satisfaction with an asynchronous e-learning system. New measures of US use satisfaction and student evaluation of teaching effectiveness (SETE). Because it has not become the target of learning. Meanwhile, this study comprehensively measures student satisfaction using instruments and develops the model for asynchronous e-learning systems. used the concept of surveying through procedures, generating items, collecting data, and validating a multi-item scale. In this study, reliability, content validity, criterion related validity, convergent validity, discriminant validity, and nomological validity were tested by analyzing data from a sample of 116 adult respondents. Instrument norms are then developed, and potential applications to practitioners and researchers are explored. This study discussed the limitations of the work. Empirically validated instruments should be of use to other researchers in developing and testing their e-learning theories. (Wang, 2003)

To explore learner communication and knowledge construction processes through transcribed online discussions, Garrison et al. [18] developed the CoI framework. CoI is based on the Practical Inquiry Model (PIM), which involves four key phases of cognitive presence that can be observed in students' online discussion postings: (1) Triggering—aware of a problem through initiating a process of inquiry, (2) Exploration—exploring a problem by searching for relevant information. relevant, engage in reflection, and share explanations (3) Integration—building meaning from multiple sources and offering possible solutions, and (4) Resolution—implementing or defending potential solutions with new thoughts or ideas. According to Schrire [19] PIM is "most relevant to the analysis of the cognitive dimension and represents a clear picture of the knowledge-building processes that occur in online discussions" (p. 491). PIM is the most widely used framework for measuring cognitive presence in online discussions compared to other content analysis frameworks for understanding cognitive development. To operationalize the four phases of cognitive presence, Garrison et al. [3] developed a set of descriptors and indicators to guide the qualitative coding of transcripts of student discourse. In CoI, discourse is a dialogue for inquiry that represents the dynamic aspects of cognitive presence and exploration of PIM [2]. Therefore, PIM is used to analyze discourse in online discussions through a transcript coding method guided by a coding scheme in which a unit of analysis (such as a message) is encoded using the four phases of cognitive presence: Event triggering, exploration, integration, and resolution. This is then followed by quantitative computation, where the resulting data is used to identify statistical insights from the discourse. Most of the research on PIM investigates patterns of distribution of cognitive presence in online discussions. have found less resolution and exploration to be the dominant phases during the inquiry process. Garrison et al. [3] concluded that students tend to stay in their comfort zone by not leaving the exploration phase because integration and resolution are more intellectually demanding. (Ayesha Sadaf, 2021)

The general aim of this research is to understand strategies that can support the utility of and access to high-quality teacher professional development (PD). This research aims to examine the design and delivery of online asynchronous courses for science teachers using a massive online open course (MOOC) platform. The conceptual framework considers three areas of research: the characteristics of high-quality PD for K12 teachers, development of social capital and identified challenges in MOOCs and computer-supported collaborative

learning and participation. Design/methodology/ approach This is an empirical mixed methods study detailing the PD course design and implementation strategy exemplifying the conceptual framework. The authors collected three data sources from 41 teachers who completed the course. This includes post-course satisfaction surveys, teacher semi-structured interviews and discussion board contributions. (Susan A. Yoon, 2020)

Participatory modeling (PM) processes involve stakeholders in developing simplified representations of reality based on stakeholder knowledge, perceptions, values, and assumptions about the systems in which they live and/or work. There has been an increasing need for structured methods for implementing PM processes, for obtaining knowledge from stakeholders and for representing this knowledge in a model. This research presents a method to support the participatory component of the modeling process without the need for face-to-face interaction. The method, which we call Episodic and Asynchronous (EAsy) was applied to construct a Fuzzy Cognitive Map of the Nigerian rice food farming system. Stakeholders determine the Cognitive Fuzzy Map which is then applied to develop scenarios and identify points of influence for interventions in the system. The results of this study indicate that the EAsy approach is an effective way to achieve co-production. The EAsy approach can thus be considered valid for constructing representations of complex social-ecological systems. Using results and process analysis (Glory I. Edwards, 2021)

Collaborative learning has great potential in higher education because it promotes shared knowledge construction, as well as the development of interaction-related skills that result in more essential learning processes. Based on a conceptual review of this type of learning, this work explores, from three real experiences, how a pedagogical model for virtual higher education might integrate it, and what the implications are. This study highlights among its conclusions the need for careful planning, the adequacy of dynamics to form collaborative groups, the relevance of students' practice in relation to the daily use of technology, the changing role of teaching, and autonomy in the management of learning. (Herrera-Pavo, 2021)

IV.   CONCLUSION

From the results of several research results, it can be concluded that learning using asynchronous e-learning is less effective, especially students' low cognitive levels. Requires psychological support from the environment. because there is no direct interaction, there is no trust between teachers/lecturers and students/students. Need support from the tutor/teacher. Students learn according to their respective work settings, so that they learn independently. It is necessary to do a mature design before the learning begins. So that learning can have a good impact, namely being able to improve the performance of the learner.

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