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Research Article

Testing of the "Gizinesia" Website as an Educational Media for Diabetes Mellitus Patients

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ABSTRACT

Indonesia has diabetes alert status because it ranks 7th out of 10 countries with the highest number of diabetes patients. There are five main pillars in diabetes management: education, medical nutrition therapy, physical activity, pharmacology, and independent blood sugar monitoring. Education is the first pillar that can be done with the help of easily accessible and sustainable media, one of which is the website. One of the important steps in developing educational media is to validate the media by professionals and respondents of the target group. The objective of this study is to know the development and validation of "Gizinesia" as an educational medium for Diabetes Mellitus patients according to professionals and respondents with diabetes. This research is quantitative research with a methodology approach in three steps: development, validity, and evaluation with a sample of 11 professionals and 20 respondents with diabetes. Based on validity tests by professionals, the website content was declared valid with a CVR with a CVI value of ≥ 0.80. The website construct was valid with an average calculation of r≥ 0.632. However, out of 18 items found three invalid items. Based on the validity test by diabetic respondents, the website content was found to be valid with Mean I-CVI = 0.95. However, out of 15 items, 1 item was found to be invalid and the website construct was declared valid with an average r≥ 0.7. However, of the 16 items found two items with low correlation. Therefore, the results of the validation of the "Gizinesia" website as a nutrition education medium for Diabetes Mellitus patients are valid. However, they need improvement by making an illustrated video and following the "10/20/30 Rule"

Keywords*: Development, Diabetes Educator, Diabetes Mellitus, Educational Media, Nutrition, Validation, Website*

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Introduction

The increasing prevalence of Diabetes Mellitus (DM) is a world health problem today. The prevalence of people with Diabetes Mellitus is increasing every year, especially in developing countries. In 2021, Approximately 537 million adults (20-79 years old) will be living with diabetes. The total number of people living with diabetes is projected to increase to 643 million by 2030 and 783 million by 2045 (WHO, 2016). Based on data from the International Diabetes Federation (IDF), Indonesia has diabetes alert status because it ranks 7th out of 10 countries with the highest number of diabetic patients (IDF, 2021). Management Care in general for people with diabetes in the Consensus Diabetes Management is to improve the quality of life of people with diabetes which can be achieved through several short-term and long-term programs. Achieve this can be done through education, medical nutrition therapy, physical training, pharmacological therapy, and independent blood sugar monitoring (PERKENI, 2021)

Education is the first pillar to manage diabetes mellitus. Education in diabetic patients can be done through counseling, which is expected to provide support to patients in determining priorities and goals, designing understood activity plans, and guiding independence in taking care of themselves and maintaining health (Marbun et al., 2022). Continuous education can be provided to patients through education. The use of media aims to maximize the senses present in capturing messages. The capture of knowledge provided through the sense of sight is 75% to 87%, through the sense of hearing is 13%, and 12% of the other senses. The more senses are involved in the capture of the message, the easier the message can be received by the educational target (Yunitasari et al., 2022).

Providing health education to diabetes mellitus patients is very important to help behaviour changes in diabetes patients to be better. It was found that there was a significant influence on increasing the value of self-care behaviour in diabetic patients. Health education about the diabetes diet using mass media has proven successful from the research carried out to shape compliance behaviours in undergoing a diet to improve the knowledge and compliance of diabetes sufferers. (Dwipayanti, 2017). The choice of the website as an educational media is due to the ease of access compared to other media and has the potential to be developed in the long term. The website has a structure intended to be updated as often as possible. Usually, in addition to the main page that users in general can access, a back-end page is also provided to edit the content of the website. Through the website, users can interact and discuss their thoughts (Wijaya, 2020). The results of the study in 30 patients of diabetes mellitus, the average quality of the diet before the intervention was 60.12 per cent increased to 64.38 per cent after the intervention with leaflet media (Hermawan et al., 2017). Meanwhile, in other studies using website media, there was an increase in respondents' balanced nutrition practices from 40 to 100 per cent (Farikhah, 2021).

There are several important steps in developing educational media, one of which is to validate educational media before it is used to intervene. Validation of educational media can be done by experts or professionals and respondents of the target group (Arora, 2017). Based on the results of the study Oliviera et al. showed that the educational media booklet for healthy eating during pregnancy was developed, then carried out a media validation process in the form of content validation by experts or professionals and respondents of pregnant women, getting valid results so that the booklet's use is beyond doubt and can be used by nurses or other health workers to help provide advice about healthy eating during pregnancy in pregnant women (Oliveira et al., 2014). Based on this background, researchers are interested in researching "Testing of the "Gizinesia" Website as an Educational Medium for Diabetes Mellitus Patients"

Methods

This research was conducted in Jakarta in July 2022. This research is quantitative. In this study, a validity test was carried out on the "Gizinesia" website as an educational medium for diabetes mellitus patients by professionals (dietitians certified as diabetes educators) and respondents with diabetes mellitus. The design

of this study focuses on a methodological approach in three steps namely development, validation, and evaluation (Galindo-Neto et al., 2019). The instrument consists of questionnaires and open-ended questions to assess content variables, language and writing, illustrations, quality, objectives, motivation, and relevance.

Media development is carried out by compiling educational materials based on references from various nutritional guidelines for diabetes mellitus patients. Then create content in the form of articles, videos, and infographics.

1) Development

Table 1. Educational media materials of the website "Gizinesia"

Material	Content-Type
Definition, Pathophysiology, and Classification of Diabetes	
Definition of Diabetes Mellitus	Article
Factors causing Diabetes Mellitus	Article
Classification of Diabetes Mellitus	Article
Diabetes Mellitus Management	
Diabetes Mellitus Nutritional Management	Video
List of Food Exchangers	Video
The right diet for diabetes	Video
Medical Nutrition Therapy	
Nutritional guidelines in diabetes management	Article
The concept of macro- and micronutrients	Article
The recommended composition of food	Article
Calorie needs and portion distribution of meals in a day	Article
Practical Guidelines for Nutrition **and Diabetes**	
Three principles (Type, schedule, quantity)	Infographic
Diabetic Plate-T Model	Infographic
Packaging food label reading guide	Infographic
Ideal Weight Calculation	infographic
BMI calculation	infographic
Nutritional Guidelines for Diabetes on Special Conditions	
Initial handlers during hypoglycemia	Article
Special conditions during pregnancy	Article
Special conditions during fasting	Article

2) Validation

For the validation process, the sample size is calculated from the formula: $n=Z\alpha 2.P(1-P)/e2$, where P is the expected professional proportion, indicating the adequacy of each item, and "e" represents an acceptable proportional difference compared to what is expected. A confidence level of 95% is considered, indicating that at least 70% of professionals should assess the appropriate item. Thus, the value used for the calculation is $Z\alpha 2=1.96$; P=0.85; e = 0.15 (Oliveira et al., 2014). Based on the calculation of the number of samples, the results of a total of 11 professional samples were obtained.

Based on literature review research that discusses the sample size used to validate a study in the (Anthoine et al., 2014) target group has a ratio greater than or equal to 20. Therefore, in this study, the number of samples of patients or diabetic respondents was 20 samples.

The criteria for professional appraisers are Registered Dietitian (RD), Certified Diabetes Educator (CDE), signed informed consent, and a willingness to follow the entire process of research activities. The criteria for respondents

with diabetes are men or women diagnosed with type 2 diabetes mellitus, signed informed consent, and followed the entire process of research activities.

The validation instrument consists of questionnaires and open-ended questions to assess content variables, language and writing, illustrations, quality, objectives, motivation, and relevance. Professionals and diabetic respondents will evaluate the website with two types of assessment scales, namely the dichotomy of "yes" and "no", as well as the Likert scales "strongly disagree", "disagree", "agree with enough", "agree", and "strongly agree" (Arora, 2017)

3) Evaluation

To see validity content by professionals can be analyzed using methods developed by Lawshe (1975) namely Content Validity Ratio (CVR) and Content Validity Index (CVI). Item is said to be valid if the CVR and CVI values ≥ 0.80 (de Vasconcelos et al., 2018).

The validity of the construct can be analyzed using Pearson correlation with the help of SPSS version 26. An item is said to be valid if the R-value > R table with a signification value of 5%, and the item is said to be invalid if the R-value < R table with a signification value of 5%, or using the following standard values; r = 0-0.25, the correlation is very low; r = 0.26-0.49, low correlation; r = 0.5-0.69, moderate correlation; r = 0.7-0.89, high or strong correlation; r = 0.9-1.0, the correlation is very high or very strong (de Barros Ahrens, 2020).

Results and Discussion

Validation was carried out by 11 professionals consisting of 2 people who had the last education D4 (18.2%), eight people S1 (72.7%), and one person S2 (9.1%). 11 people (100%) professional works as a nutritionist for more than seven years. Of the 11 professional people, one person (9.1%) worked as a diabetes educator for less than seven years and ten people (90.9%) worked as a diabetes educator for more than seven years.

Validation was also carried out by 20 diabetic respondents aged over 35 years (100%). Of the 20 diabetes respondents, 12 people had the last high school education (60%), 2 D3 people (10%), 5 S1 people (25%), and 1 S2 person (5%). It is known that 12 people (60%) were diagnosed with diabetes in less than five years and eight people (40%) were diagnosed with diabetes over five years. Furthermore, it is known that six people (30%) have joined the diabetes community for less than one year and 14 people (70%) have joined the diabetes community for more than 1 year.

Table 2. Content Validity Results by Professionals

No.	Items	The panellist replied, "Yes		CVR Critical	Information
		n	CVR		
1	The content discussed presents appropriate information regarding nutritional guidelines for diabetes	11	1	0,80	Accepted
2	The information presented is scientifically correct	11	1	0,80	Accepted
3	Well-structured information	11	1	0,80	Accepted
4	The content displayed is indispensable	11	1	0,80	Accepted
5	The material discusses nutritional guidelines for diabetes mellitus	11	1	0,80	Accepted
6	Title according to the material	11	1	0,80	Accepted
7	The content / material discusses solutions in solving nutritional problems in diabetes mellitus	11	1	0,80	Accepted
	CVI		**1**		

Based on the results of table 2. above, for the results of the content validity test conducted by professionals on the Gizinesia website, the average CVR value is 1 and the CVI of the entire item is 1. This shows that the content or material contained in the Gizinesia website as a whole is accepted or declared valid because the average of the overall CVR and CVI values ≥ 0.80

Table 3. Construct Validity Test Results by Professionals

Items	r count	r table	Information
Language and Writing			
The language used is by the understanding of the target	0,764	0,632	Valid
The text appears clear and comprehensive	0,919	0,632	Valid
The typeface (font) used on the media is easy to read	0,919	0,632	Valid
The combination of text colour with background on media is visible	0,361	0,632	Invalid
Illustration			
The illustrations used have the right design for diabetes mellitus respondents	0,944	0,632	Valid
The illustrations presented are necessary to understand the whole content	0,919	0,632	Valid
Illustrations and texts motivate respondents with diabetes mellitus to understand the proposed theme	0,725	0,632	Valid
The illustrations on the infographic are interesting	0,880	0,632	Valid
Slideshow/material on interesting videos	0,527	0,632	Invalid
Quality			
Audio is heard clearly	0,814	0,632	Valid
Good video resolution	0,870	0,632	Valid
The quality of moving media (video) in media is good	0,880	0,632	Valid
The overall media quality is good	0,527	0,632	Invalid
Relevance			
This medium is perfect for use by experts in nutrition to assist in carrying out activities and education in patients with diabetes mellitus	0,947	0,632	Valid
This media is suitable for online diabetes nutrition education	0,947	0,632	Valid
The material in the article is well conveyed	0,880	0,632	Valid
The material in the video is well conveyed	0,919	0,632	Valid
The material in the infographic is well conveyed	0,919	0,632	Valid

Based on table 3 above, for the results of the construct validity test conducted by professionals as a whole, an R-value of ≥ 0.632 was obtained so that the content on this website was declared valid, even though found three items with calculated R-value <0.632 were "The colour combination of text with *background* on media is visible", "The slideshow/ material on the video is interesting ", and "The overall quality of the media is good".

Based on the results of table 4 below, for the results of the content validity test conducted by diabetes respondents on the Gizinesia website, the average I-CVI value of all items was 0.95. This shows that the content or material contained in the Gizinesia website accepted or declared valid because the average of the overall CVI value is ≥ 0.80. It's just that in the item "The presentation of the material increases your enthusiasm to follow the nutritional guidelines of diabetes in everyday life".

Table 4. Content Validity Test Results by Diabetes Respondents

No.	Items	The panellist replied, "Yes		Information
		n	I-CVI	
1	**Content**			
	The content discussed presents appropriate information regarding nutritional guidelines for diabetes mellitus	20	1	Accepted
	The information presented can be traced to the source or the reference is scientifically	20	1	Accepted
	Well-structured information	20	1	Accepted
	The content displayed is indispensable	20	1	Accepted
	The content/material discusses solutions to solving the problems needed for diabetes mellitus patients	20	1	Accepted
2	**Objective**			
	Title according to the material	20	1	Accepted
	The presentation of the material is easy to understand	17	0,85	Accepted
	The presentation of the material is quite interesting	20	1	Accepted
	The material is delivered in sequence	20	1	Accepted
	The chosen delivery method is correct	20	1	Accepted
3	**Motivation**			
	After being given this material you are motivated	17	0,85	Accepted
	The presentation of the material can interest you to learn the material on nutrition in diabetes	20	1	Accepted
	The presentation of the material makes you listen to the nutritional material well	17	0,85	Accepted
	The presentation of the material increases your curiosity about nutrition in diabetes	20	1	Accepted
	The presentation of the material increases your enthusiasm to follow the guidelines for diabetes nutrition in everyday life	15	0,75	Rejected
	Mean I-CVI		**0,95**	

Table 5. Construct Validity Test Results by Diabetes Respondents

No.	Assessment Items for Diabetes Respondents	r count	Information
1	**Language and Writing**		
	The language used in the content matches your understanding	0,813	Strong correlation
	The language used can encourage critical thinking	0,888	Strong correlation
	The text is visible	0,490	Low correlation
2	**Illustration**		
	The illustrations used have a nice and precise design	0,906	Very strong correlation

No.	Assessment Items for Diabetes Respondents	r count	Information
	The illustrations presented are necessary to understand the whole content	0,812	Strong correlation
	The illustrations and text displayed motivate you	0,905	Very strong correlation
	The illustrations on the infographic are interesting	0,863	Strong correlation
	The slideshow/material on the video is interesting	0,881	Strong correlation
3	**Quality**		
	Audio is heard clearly	0,750	Strong correlation
	The image quality on the infographic is good	0,735	Strong correlation
	The quality of moving media (video) in media is good	0,389	Low correlation
	The overall media quality is good	0,892	Strong correlation
4	**Relevant**		
	This medium is suitable for use by nutritionists for educate you	0,820	Strong correlation
	This media is suitable for online health education	0,819	Strong correlation
	The material in the article is well conveyed	0,819	Strong correlation
	The material in the infographic is well conveyed	0,894	Strong correlation

Based on table 5 above, for the results of the construct validity test conducted by diabetic respondents on the components of illustration, quality, relevance, language, and writing on the Gizinesia website, there are those declared valid with low correlations to very high correlations. For example, the correlation is very strong in the items " The illustrations used have a good and precise design" and "The illustrations and text displayed motivate you". In contrast, the correlation is low on the items "Text appears clear" and "The quality of moving media (video) in media is good".

1) Development of Gizinesia Website as an Educational Media for Diabetes Mellitus Patients

In the process of developing educational media for the "Gizinesia" website, which is carried out by the research conducted by Arora, where in developing an educational media there are three stages that must be carried out. The first stage is determining the purpose and objectives of developing educational materials (Arora, 2017).

Media development starts with the discussion stage with professional nutritionists and diabetes educators. Then, it develops educational materials based on references from various guidelines or nutritional guidelines for diabetes mellitus patients to compile material in educational media. This stage is the research of Arora et al., namely, the second stage of developing educational media is to make a draft of educational media content or material (Arora, 2017).

In this study, we also validated the content and constructs of the diabetes nutrition education media website "Gizinesia" by professionals and respondents with diabetes. This stage is also by the existing processes in media development. The third stage in the development of educational media is to validate educational media by experts or respondents of the target group (Arora, 2017).

In addition, there is other research evidence that in the development of educational media, media validation must be carried out by experts and with various methods so that the media can be effectively used in education. Based on the research Harder conducted in the development and validation of media it is necessary to evaluate more closely the equipment (for example, device, screen size) and technology (for example, internet speed) used to determine how such factors may affect the results. Future research should aim to evaluate additional measures and validate new measures to be normalized and designed for use in virtual spaces or online media (Harder, 2020)

Based on the results of Oliviera's study, shows that the educational media booklet for healthy eating during pregnancy that was developed, then carried out a media validation process in the form of content validation by experts or professionals and respondents of pregnant women obtained valid results so that the booklet was used undoubtedly and could be used by nurses or other health workers to help provide advice about healthy eating during pregnancy in pregnant women (Oliveira et al, 2014)

Other research conducted related to the development and validation of EMPIRE (Emotion and Mind Power In Relationship with Eating) online nutrition education videos for millennials with overweight/obesity, on content and construct components (illustrations, quality, relevance, language, and writing) according to experts is valid and this media is suitable for use by nutritionists or other health workers to help intervene in the form of educational activities for patients or millennials with overweight body/obesity (Palupi et al., 2021).

In the development of educational media, especially learning media for the community, every sector must be involved in every step from identifying problems and needs, decision making, planning and implementation, as well as monitoring and evaluating to encourage correct participation that is by the context of society and creating sustainability. For participation to occur correctly, the target group must be clear (Kuhaswonvetch et al., 2017).

One method that can be used in developing educational media is the ADDIE model. The ADDIE learning model (Analyze, Design, Develop, Implement, Evaluate) is considered the right model for developing mobile applications as a learning medium. The KGD Maternal application has proven to be an effective learning medium for maternal emergency learning for obstetrics students. Obstetricians and media experts validate this research. The students confirmed the usefulness and ease of application of KGD Maternal. The students also gained a better understanding of maternal emergencies related to PPH through the KGD Maternal application. This application is an easily accessible medium and a useful resource in the learning process as affirmed by the assessment of obstetrics students the KGD Maternal application is useful in maternal emergency learning (69.6%) and easy to use in the teaching and learning process (73.2%) (Giena et al., 2022).

2) Validity of Content and Website Constructs by Professionals

Based on the validity test on the website according to the professional as a whole the content and construct components in the diabetes nutrition education media the website "Gizinesia" is declared valid. Still, it needs improvements to the language and writing variables, namely the item "The combination of text colour with background on the media is visible"; this is due to the differences in the media used to access the website by different respondents.

Overall, the combination of colours, types, and text sizes on the Gizinesia website is by the standard, Arial with 13-point font size in black and dark grey, as well as a white background. According to Romeltea, the type and size of the letters meet the aspects of Scannability & Readability so as to make the user comfortable (user, visitor, reader). Scannability means it is easy to scan. Readability means it is easy to read. A blog or website's type and font size should make readers comfortable and not exhaust the eyes. Refers to Scriptol, which presents the type and size of used by Amazon, Google, Apple, and the New York Times. The result was that the font size ranged from 13 to 14 points. The font types are Arial, Verdana, Helvetica, and Georgia. Colour the letters black (black) or dark grey (dark gray) with HTML colour code #333. The background colour is always white (white) (Romli, 2014).

In the construct component, 1 item was also found to be invalid, namely in the item "Slideshow/material on interesting videos", three professional people replied "quite agree", giving suggestions, namely "expand the content in the video", "the writing on the DBMP video slide is too small". Therefore, it is best to improve this item by referring to the 10/20/30 Rules (Guy Kawasaki, 2005). The use of slides in videos is not in question; this is in line with a study of 46 dental students comparing video-based and slide-based teaching. From both in-

terventions arose a significant increase in comparable values. There were no significant differences between the groups given video-based or slide-based material (Kruse et al., 2022).

Five things need to be considered in making interesting video-based learning, namely determining the video format, choosing the production mode, making a video script, choosing the right audio, and final reviewing the entire video before publication. Then, content creation and curation, assessment, vision of bandwidth issues, and privacy policies are implementer. As one of the improvement solutions can also be made illustrative videos. Illustrative videos are a great way to define the topic concretely. Illustrations and graphs provide clarity and ensure that respondents have a deep understanding of the concept of the material presented in the video (Nanda, 2017).

3) Validity of Content and Construction of The Gizinesia Website by Diabetes Respondents

Overall the content in the diabetes nutrition education media website "Gizinesia" was declared valid, although 1 item was rejected, namely "Presentation of material to increase your enthusiasm to follow diabetes nutrition guidelines in daily life" Data is known from 20 respondents, four people answered "no" in this item known to be diagnosed with diabetes for less than five years. A study also conducted by RSI Surakarta showed that the proportion of diabetic distress sufferers with a long <5 years is greater (33.0%) compared to people with diabetic distress with a long period of ≥5 years. The study also had a p-value = 0.001 meaning that there was a significant relationship and strong correlation strength). This supports the theory that people who have just suffered from diabetes still have difficulty adapting and lack motivation for sudden lifestyle changes.(Permana, 2017)

Based on the validity test on the website according to diabetes respondents, the overall construct component in the diabetes nutrition education media website "Gizinesia" was declared valid. Still, it was found that there were two items with low correlation, namely in the item "Text is visible" and "The quality of moving media (video) in the media is good", so according to diabetes respondents there needs to be improvements in the text and video on the website.

In the item "Clear visible text," a low correlation can be due to the respondent's viewing power. The text used on the "Gizinesia" website is Arial measuring 13 points of black colour and dark ash with a white background. This is by the standard that the font size on the website should range from 13-14 points. The font types are Arial, Verdana, Helvetica, and Georgia. Colour the letters black (black) or dark grey (dark grey) with HTML colour code #333. The background colour is always white (white) (Romli, 2014).

Based on the characteristic data of respondents, all respondents were over 35 years old; this is by the study that many suffered from tired eye pain, namely in the age range of 36-45 years (late adulthood) as many as 15 people (41.7%) experienced a decrease in vision. At that age, there begins to be a decrease in function in body systems, including the sense of sight. With age, there is a decrease in the accommodation power of the eyes. Accommodation abnormalities usually occur at the age of 40 because the lens of the eye becomes stiff with age, so the ability of the lens of the eye to make accommodation decreases (Nurrohmah et al., 2017).

In the item "The quality of moving media (video) in good media", getting a low correlation can be caused because one video titled "Getting to Know the List of Food Exchangers" displays slides in large quantities. For improvements in moving media (videos) featuring slides in it should refer to one of the effective presentation-making guidelines, namely the 10/20/30 rule by Guy Kawasaki. This guide suggests using ten slides in a presentation that is less than 20 minutes long and the text written on each slide should have a font that is 30 points in size. Thus, the speaker must spend two minutes explaining each slide. These regulations can make for a more quality presentation (Guy Kawasaki, 2005).

To determine the validity of website media, it is necessary to research on a large scale with varying samples. This is in line with research

that aims to determine the impact of health literacy programs on diabetes mellitus patients; the results of health literacy programs can improve self-care behaviours, and health outcomes in older people with diabetes and hypertension comorbidities. Health care providers in chronic care clinics in private and public primary care units can implement this program for implementation. Further studies should be considered in the form of large-scale randomized controlled trials to validate sample sizes and other settings for research validation (Kakahthum et al., 2022).

Based on research on 4D programs for blood sugar control of diabetic patients, this research intervention program is effective. To ensure the effectiveness of a program, that is, a theory-based intervention program, especially in selecting factors related to the desired health behavioural outcomes. Program intervention activities, including education, be interrelated and have mutual interaction. The information must be specific to achieve the individual's behavioural health targets. Observation skills, the ability to make judgments and the patient's capacity to react appropriately should be emphasized individually for example through the provision of special media for self-monitoring; by identifying the criteria for conducting the assessment; suggests a realistic evaluation of self-efficacy (Therawiwat et al., 2022).

As one of the improvement solutions can also be made illustrative videos. Illustrative videos are a great way to define the topic concretely. Illustrations and graphs provide clarity and ensure that respondents have a deep understanding of the concept of the material presented in the video (Nanda, 2017).

Conclusion

The research on the development and validation carried out on the nutrition and diabetes education media of the "Gizinesia" website conclude that the validity test analysis on content and constructs by professionals was declared valid. Still, it was necessary to improve the appearance of slides/video materials by making an illustrative video and following the "Rule 10/20/30". The results of the analysis of the validity test on content and constructs by diabetic respondents were declared valid. Still, it was necessary to improve the quality of moving media (video) by making illustrative videos and following the "10/20/30 Rule".

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