VIDEO CONTENT DEVELOPMENT GUIDES BASED ON TEACHING EXPERIENCES

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ABSTRACT

This paper describes a research study on video content development. Due to the COVID-19 pandemic, all kinds of education and training switched from traditional classroom teaching to online and distance learning. The effect of e-learning will be the integral part of the higher education's primary structure. The challenge of online teaching in higher education is to prepare learning materials for students with corresponding quality in various types. The video contents are one of important type of teaching and learning materials. This is one of most welcomed learning materials by students during online and distance teaching. Advantages of video contents are easy to follow focus of lesson, can hear and watch simultaneously, or just can hear if want, or just can watch if not possible to hear, more realistic, gives feeling like takes lesson in classroom. But, to prepare video contents requests a lot of time and preparation. It needs corresponding skills from teacher and it is costly. To support video content with high quality can be offer well defined guidance which helps to prepare good video contents. In this study authors are explained experience-oriented guidance for video content development.

KEYWORDS

Online teaching, distance teaching, higher education, quality of video lessons, SURE model, evaluation.

1. INTRODUCTION

In a UNESCO document on the theory and methodology of e-learning: online teaching is the way of acquiring knowledge and skills using tools that are mostly based on web and computer devices.It may take place in or out of the classroom. It can be referred as a counterpart of distant learning that may be engaged in an online platform used for educational purposes [1].

The process of using a set of technological tools which have a function of sharing or exchanging any kind of information with an intention of enhancing student's knowledge and skills creates the foundation of the technology enhanced learning. It allows students to discover the relevant information for their studies using diverse electronic resources. Integration of learners with web-based applications gives access of engaging through online platforms and enables exchange of information. Using the relevant electronic tool as a teaching methodology gives access to improve the training experience and makes it more creative which is one of the advantages of digital learning concept [2].

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E-learning involves four main components such as: a person who delivers the information or skills, a person who receives it, a technological device and, data that is shared during this process. This has become a substantial part of learning for students as it can be achieved from any distance and time [3].

The main difference of e-learning from the distance learning is the use of electronic device and internet. In other words, it can be referred as a channel that delivers information from one point to another numerous destinations at any time. In the beginning of introduction of digital learning, people did not fully acknowledge it because most of the part of this process includes machinery which made an impression that it has a deficiency in human contribution in education system [4].

Because of the existence of coronavirus pandemic, a mass gathering is strongly restricted in many areas of the globe. This has led educational institutions to make relevant changes into the standard education system making it more digitalized. The most effective method of proceeding teaching and learning steps is e-learning because it can be achieved from anywhere and at any time. However, there are obstacles and statistical indicators, that show the low level of effectiveness in gaining new information and skills [5].

Adekola and Dale (2017) show in the study that E-learning involves two main elements and six components as shown in the Figure 1 [6]. In the first element of this framework, the author referred three counterparts related with engagement of learners with the technology. In the second dimension, there are three components which involve activities concerning learning and processing information and skills [7].

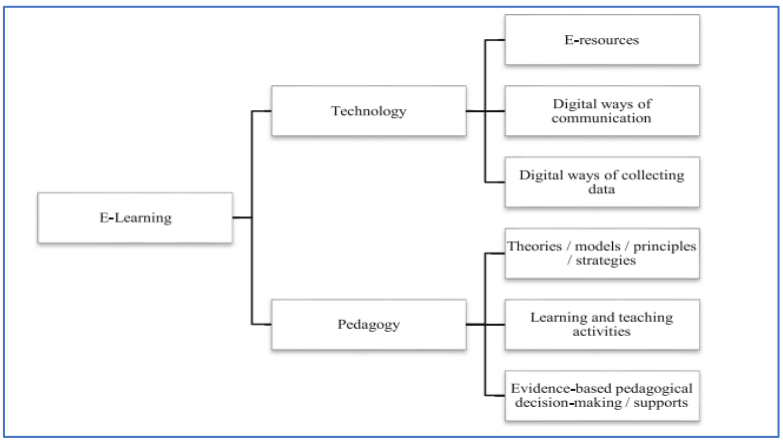


Figure 1. An e-Learning framework in school education consisting of two dimensions and six components

When it comes to enhancement of learning and verification of the performance, assessment is one of the primary tools for educational institutions [8].

Assessment that can be proceeded through digital environment is called e-assessment [9]. This can enable various opportunities which makes it more distinguish than the traditional assessment process. The digitalization of assessment can simplify the scoring process making it more time-saving. On the other hand, with the help of e-assessment, teachers can gather essential data from the students works [10] and can get a guaranteed answers and marks that will confirm the final score[11].

Digitalization and automatization have brought a considerably massive changes in our thoughts of how education system can be reformed. However, there are still a lack of deeper

understandings of assessment in this regard. Hence, the majority is discussing about the assessment that comprehends genuine assessment and encourages the users [12-13].

Numerous institutions are currently studying the diverse technology-based applications that use personal data for more reliable e-assessments[14-18].Regarding the outcomes, e-assessment offers more time-saving and rational options and makes the process more innovating[19].However, when using e-assessment, there is a small chance of avoiding fraud which makes it weaker. To prevent such issues, professionals from the TeSLA corporation (https://tesla-project.eu) created a tool that can identify face and voice of an individual, any information that is considered as a transcript, etc [20].

On of the integral part of higher education is a concept of video. It is often used both in traditional and e-learning environments as a main source for sharing an essential information. A number of studies have presented the statistical proofs of the effectiveness of e-learning [21-22] and other works also have shown the importance of the use of video in teaching and learning methodology. [23-28].

2. STATE OF THE ART

The video content is one of important teaching element for e-learning. There are many different tips around how to create video content for teaching. Vyond Studio defined 25 different hits to create video content[29]. These hints consist of five different dimensions: Planning, Writing, Storyboarding, Creating and Distributing. Each dimension included sub sections where explained what should care during preparation of video content. Gretchen Vierstra shared learned lessons and advantages of video lessons [30]. Gretchen Vierstra recommended to care “working memory” of students, that means video lessons should be short. Next hints from her is the cognitive load which should support students who cannot concentrate on different focuses. Further hits directed to care various ways to access the information for students. Patrick Lowenthal with his colleagues noted that one of method to engage students during e-learning is video-based discussions [31].

Teaching and learning during COVID-19 pandemic requested to try different engagement methods to keep student’s motivation to study. The synchronous video-based discussions can give opportunities to students feel in social presence together with class mates and offers chance to illustrate and demonstrate how to solve learning problems [32]. Rahmatika in cooperation with his colleagues published the paper about effectiveness of Youtube videos as one of useful video content for teaching and learning [33]. Main focus of Rahmatika is how can be fill missing gap of teacher’s skill to work tools for video contents. Dur to the COVID-19 each single teacher must be teaching his/her course online, from distance. But not all teachers had corresponding skills to work with video tools. Usually quality of prepared video contents could not meet expected results of students and parents. To solve in some case this problem his team offered to use free Youtube videos for teaching. B.D. Coller and M.J. Scott described in their paper about teaching case of mechanical engineering courses based on video games [34].

As result of their study found out that students spend twice more hours on video game with learning material comparison with traditional learning materials. In case of Peter D. Wiens and hisco-authors study focus directed to application of video content to assessment of teacher education [35]. Zaneldin E. et. al. used as teaching tool video contents for engineering courses and did survey to investigates the effectiveness, benefits, and students’ satisfaction of students [36]. In total 67 students attended to survey and survey result shows that students prefer to receive learning materials in video content and study in blended type of study.

3. GUIDANCE FOR VIDEO CONTENT DEVELOPMENT

Why do we need a videocontent on this topic? How to make a video? How to reach your students? What is your experience? How to evaluate the video content? will answer the question. The quality of video content for teaching depends a lot from preparation and development phases. Not all teachers have enough experiences and skills to work with video contents. But today's teaching materials for students requests to include various type of teaching tools and methods for student's engagements. One of basic method for this is to use video content in teaching. To support teachers who has not big experience with video content our team developed special guidance for video content development. The guidance consists of three phases.

3.1. Pre-phase

Not everything should be taught through video, so be strategic about why you're using the medium to deliver a particular topic [37]. Therefore,first and important phase of preparation of video content is Pre-phase.

What can be done to help you reach your goals? think about and prepare video content. For example, what is the student's learning style? How to choose the content of the topic? What elements (text, pictures, diagrams, graphs, tables, sounds, recordings, animations, illustrations) should be used to introduce the concept? etc. Didactic solutions for teaching methods need to be considered and planned in order to achieve and achieve the objectives of the lesson.

At this stage, video content planning should be done according to the following instructions.

- *Research and analysis of course materials*

Study and analyse video content course materials. This may include the syllabus, pictures, tables, diagrams, audio, and additional videos used in the lesson. Course files can be placed on cloud-based devices such as google drive, one drive, and Dropbox for sharing. For example, in our experiment, we used Figure 2 to upload the file to Google Drive and OneDrive.

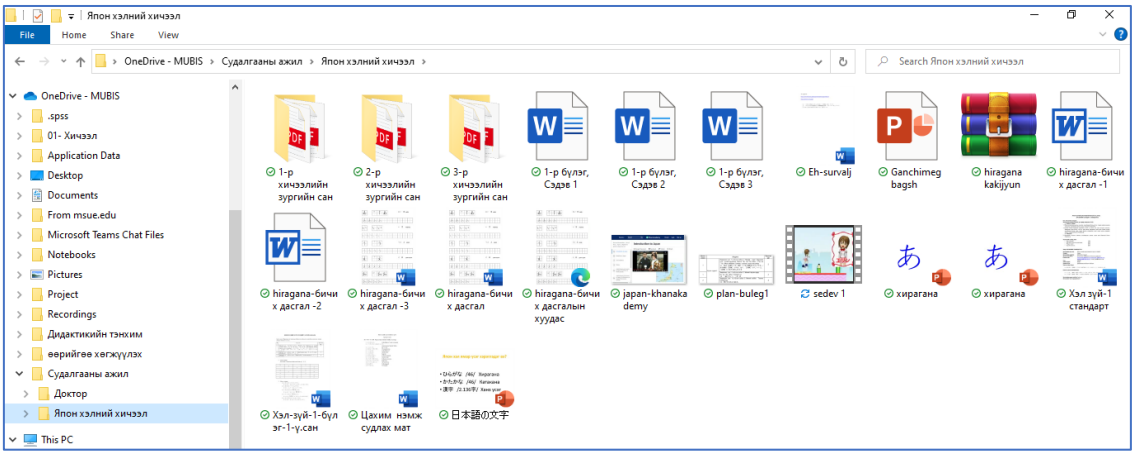


Figure 2. File library located on OneDrive

- *Plan which elements to use. Make a storyboard*

Plan a storyboard before developing a video content. In other words, plan the script for the screenplay. For example, plan the script for the screenplay. A storyboard is a series of images and symbols that show the background image of each frame (slide for ppt), the main scene, appearance, who and where to do, what elements and information to use, and what activities take place. In addition to drawing the storyboard by hand on paper, you can design it using a program that suits you. The following example shows a detailed Storyboard design for each screen (Figure 3 and 4).

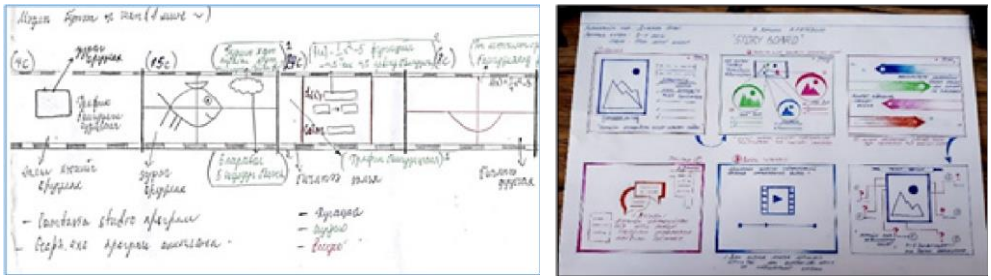


Figure 3. An example of a storyboard

Figure 4. The process of developing a storyboard

If you prefer to hand-draw your storyboard, you don't need to draw boxes for every frame use this free template [29].When designing a storyboard, select the type of video using the video tutorial templates in Figures 5 and 6.

Hansch [38] also provide a catalogue of video production styles 'as a method of providing a current overview of the field'. Their division is based on what they refer to as the production style's 'different affordances of learning'. The production styles they define can also be combined in various forms. They list the following 18 production styles:

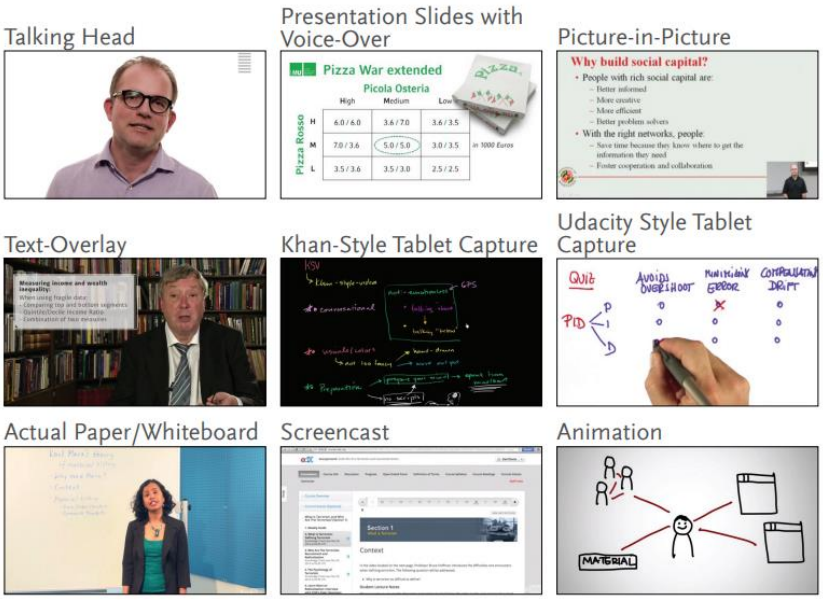
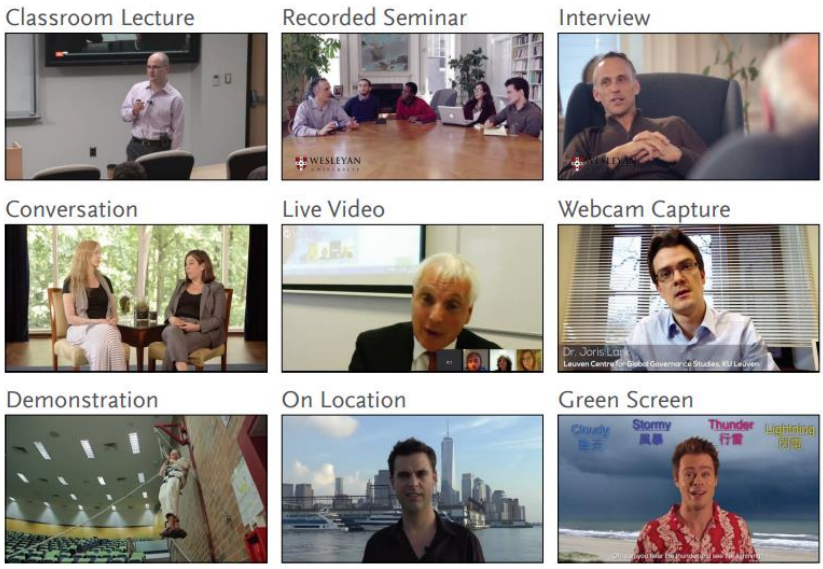


Figure 5. Typology of Video Production Styles [38]



Virtual class or green screen recording

Tablet and mobile phone camera recording

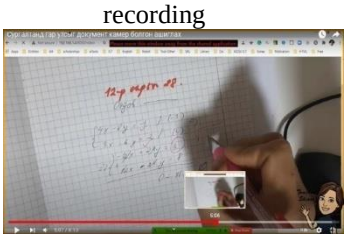


Figure 6. Typology of Video Production Styles

3.2. Development phase

After preparation of above defined elements man can start to develop video contents.

- *Select technology and develop materials*

Video contents can be made professionally, in the studio, or in a quiet environment using simple software. Table 1 shows the possibilities of working with video product development software information. In addition, video editing software can be used online. For example: https://www.loom.com, https://www.vidyard.com

Table 1. Ability to work with video processing software information

No	Activity	Power Point	Moviemaker	Camtasia	iSpring suite	SnagIt	Adobe Premier
1	Write text	+	+	+	+	+	+
2	Upload a photo	+	+	+	+	+	+
3	Insert audio	+	+	+	+	+	+
4	Audio editing			+			+
5	Upload video	+	+	+	+	+	+
6	Video editing		+	+			+
7	Insert shapes	+			+	+	+
8	Insert effects	+	+	+	+	+	+
9	Record Audio…	+	+	+	+	+	+
10	Screen Recording	+		+		+	
11	Add Quiz/Survey			+	+		
12	Save in video format	+	+	+	+	+	+

3.3. Evaluation phase

Ready video contents should go through local evaluation. For evaluation of prepared video contents team applied structure-oriented evaluation SURE model [39].

This method is called SURE (**S**tr**U**cture o**R**iented **E**valuation) and is designed to contribute to the space for evaluating e-learning with a science-based methodology (Figure 7). The model was first discussed at its first meeting in 2011 to assess e-learning in a multi-dimensional space with the participation of all stakeholders. One of the features of this methodology was that the goals of the evaluation were defined by the main and sub-goals, and then these goals were expressed in a logical scheme [40-42].

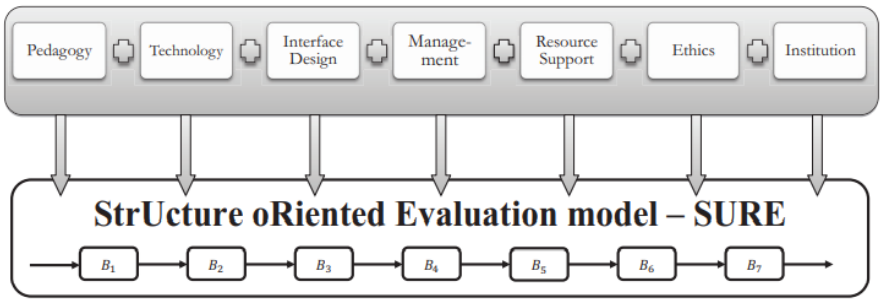


Figure 7. Evaluation and e-learning framework [42]

Step 1. Definition of key goals

The main aim of the first step of the SURE model is to define key goals of evaluation process. All defined key goals should reach its target and the general evaluation result will be successful or bigger than zero only if all key goals reached their target successfully. If one of the key goals is failed, then the e-learning process will be evaluated as failed. The main goals of the evaluation:

- Planning (B_1)
- Technologists (B_2)
- Contents (B_3)
- Performance (B_4) dependence, implementation

consists of goals(Figure8).

Figure 8. Goal structures of video content

Step 2. Definition of sub goals

Determining the steps that need to be taken to achieve the main goals is the step that defines the sub-goals.

In order for Planning (B_1) to be successful, the following sub-goals must be met. These include:

- Course content planning (A_{11})
- Lesson material planning (A_{12})
- Lesson methodological planning (A_{13})
- Screen design (A_{14})
- Course file compilation (A_{15})

The following sub-goals must be met in order for Technology (B_2) to achieve its primary objectives. These include:

- Environment (A_{21})
- Video (A_{22})
- Speaker's voice (A_{23})
- Accompanying sound (A_{24})

Content (B_3) in order to achieve the main goal, the following sub-goals must be met. These include:

- Topic content (A_{31})
- Object (A_{32})
- Record type (A_{33})
- Information Ethics (A_{34})
- Spelling and grammar (A_{35})
- Didactic solution (A_{36})

Performance (B_4) in order to achieve the main goal, the following sub-goalsmust be met. These include:

- Video content Troubleshooting (A_{41})
- Video content distribution (A_{42})

Figure 9 shows the structure of the sub-goals, which consists of five, four, six, and two sub-objectives.

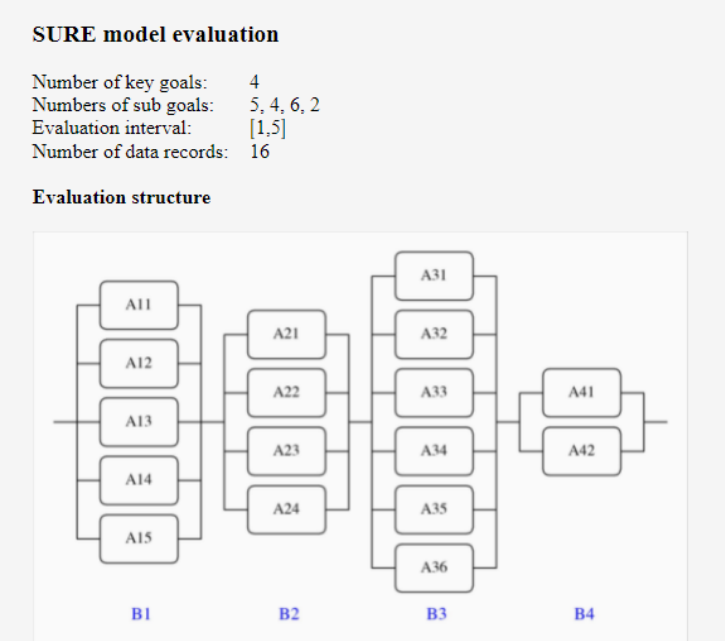


Figure 9. Evaluation sub-goalsstructure

Step 3. Confirmation of evaluation goalstructures

We defined four goals as key goals. These key goals should reach its target all together. This is essential important for goal structure definition. First key goal consists of five, second key goal consists of four, third key goal consists of six and fourth key goal consists of two sub goals. Difference of sub goals from key goal is if just one of sub goal is evaluated as successful the corresponding key goal will be receiving successful evaluation score.

The purpose of this evaluation was presented and approved by the student who developed the video content, the student who was the teacher, the student who developed the SURE methodology, and the leaders of the video content development teams.

Step 4. The checklist of evaluation

The checklist of evaluation should create based on defined goal structures of the SURE model. Basically, sub goal definition can become fundamental for checklist questions. In Table 2 show example questions which developed for key goals Planning and Technology.

Table 2. Development of questions related to the main goalsof Planning (B_1) and Technology (B_2)

		Corresponding points	5	4	3	2	1
		Evaluation indicators	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
Planning (B_1)	1	The content of the lesson is designed in a simple, clear and interesting way					
	2	The course materials are designed to fully express the content, and the type and format appropriate to the video is selected.					
	3	The teaching methodology is designed to be motivating and engaging					
	4	Each frame was clearly mapped, each element was formulated in detail, and explanatory notes were made					
	5	The file directory and resources used in the lesson are well established					
Technology (B_2)	1	The video should be played on any player and on devices such as a mobile phone or tablet					
	2	The video is well timed, uninterrupted, non-vibrating, and recorded normally.(Not more than 6 minutes)					
	3	The teacher's speech and explanations are recorded clearly and audibly					
	4	Accompanying sounds and audios are written in accordance with the content					

The question is developed in the form of a final definition, and the data are collected by measuring the extent to which the evaluator agrees with the definition. Here:

- Strongly agree - 5 point
- Agree - 4point
- Don't know - 3point
- Disagree - 2point
- Strongly disagree - 1point

Step 5. Acceptance of checklist

The checklist should control by all involved groups in evaluation process and only checked and confirmed checklist should be apply for data collection. Clear formulation of questions is only one aspect of checklist. Each member of the evaluation team has to check that before confirmation and, if necessary, appearance and design of checklist has to be improved.

Step 6. Data collection

There are several techniques for data collection: surveys and questionnaire, tests and assessments, interviews, focus groups, action plans, case studies, and performance records [43]. Evaluation team can use any of these techniques. Most attractive and fashion technique is online checklist. Data collection via online checklist increases quality of collected data avoiding human error during paper-based data collection.

In this study, we used the Google form free online survey form (Figure 10).

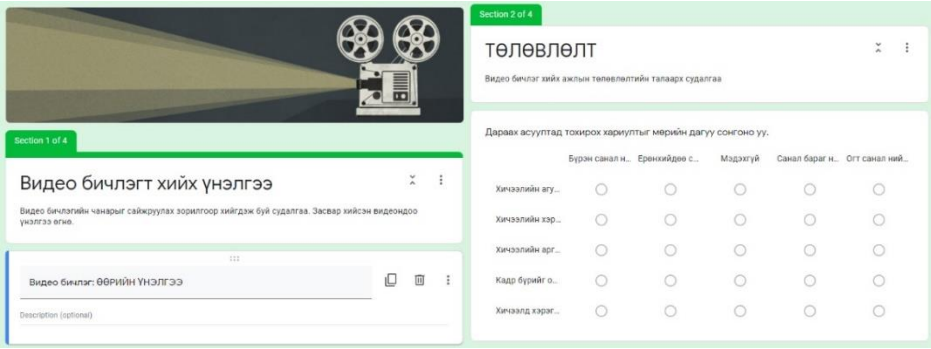


Figure 10. Questionnaire example in Google form

Step 7. Data processing

Another advantage of the SURE method is the online data processing calculator for the method [44].The online calculation program starts with the main window called SURE model evaluation.

- Enter checklist data - enter the collected data in the appropriate format
- In the Color scale type section, select from 4 color options to adjust the color of the result table.
- Checklist data display format –collected data can be show in result table in three different view
- In the Evaluation table - select the format in which the SURE evaluation results will be displayed

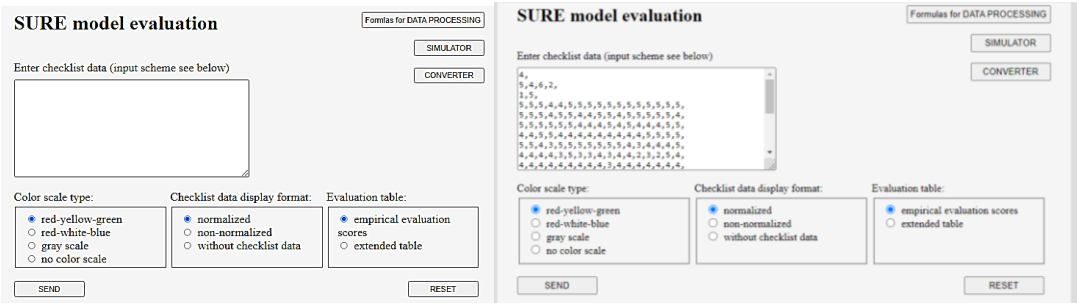
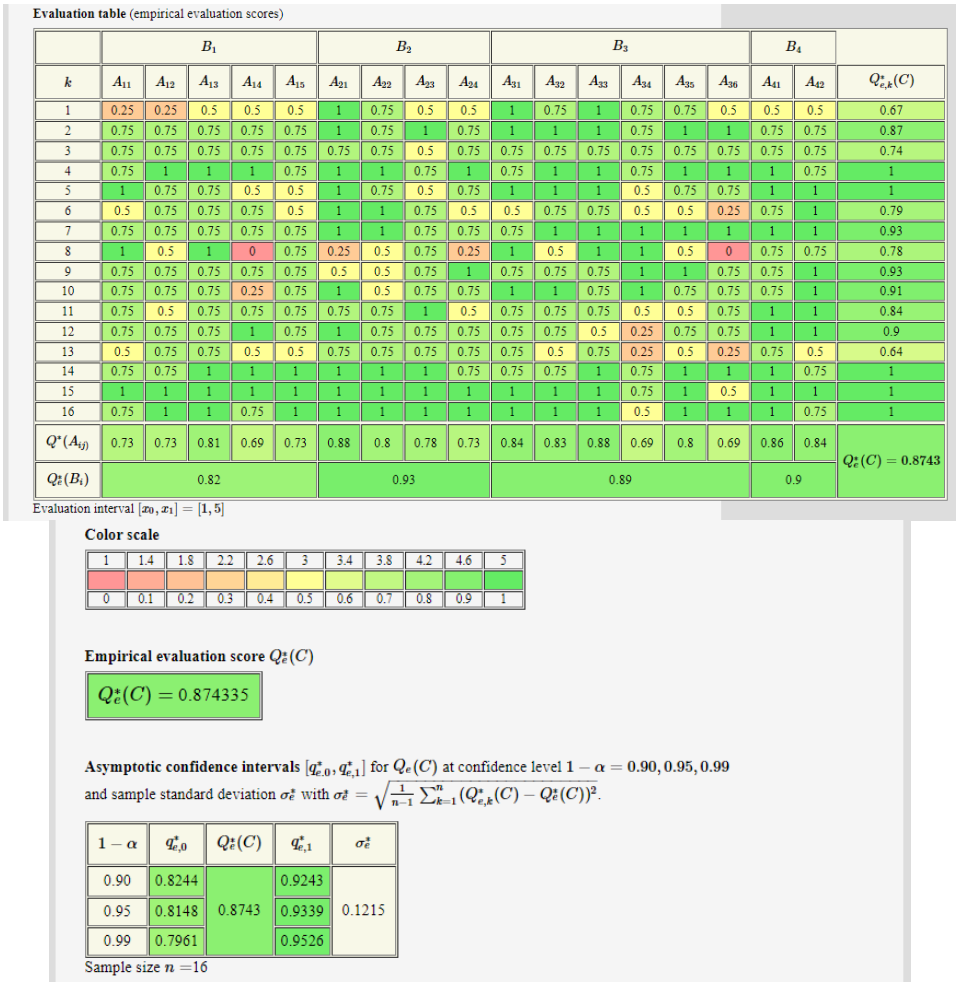


Figure 11. The upper part of the data calculation program

Step 8. The evaluation reports



Evaluation table (empirical evaluation scores)

	B_1					B_2				B_3						B_4		
k	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	A_{21}	A_{22}	A_{23}	A_{24}	A_{31}	A_{32}	A_{33}	A_{34}	A_{35}	A_{36}	A_{41}	A_{42}	$Q^*_{e,k}(C)$
1	0.25	0.25	0.5	0.5	0.5	1	0.75	0.5	0.5	1	0.75	1	0.75	0.75	0.5	0.5	0.5	0.67
2	0.75	0.75	0.75	0.75	0.75	1	0.75	1	0.75	1	1	1	0.75	1	1	0.75	0.75	0.87
3	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.74
4	0.75	1	1	1	0.75	1	1	0.75	1	0.75	1	1	0.75	1	1	1	0.75	1
5	1	0.75	0.75	0.5	0.5	1	0.75	0.5	0.75	1	1	1	0.5	0.75	0.75	1	1	1
6	0.5	0.75	0.75	0.75	0.5	1	1	0.75	0.5	0.5	0.75	0.75	0.5	0.5	0.25	0.75	1	0.79
7	0.75	0.75	0.75	0.75	0.75	1	1	0.75	0.75	0.75	1	1	1	1	1	1	1	0.93
8	1	0.5	1	0	0.75	0.25	0.5	0.75	0.25	1	0.5	1	1	0.5	0	0.75	0.75	0.78
9	0.75	0.75	0.75	0.75	0.75	0.5	0.5	0.75	1	0.75	0.75	0.75	1	1	0.75	0.75	1	0.93
10	0.75	0.75	0.75	0.25	0.75	1	0.5	0.75	0.75	1	1	0.75	1	0.75	0.75	0.75	1	0.91
11	0.75	0.5	0.75	0.75	0.75	0.75	0.75	1	0.5	0.75	0.75	0.75	0.5	0.5	0.75	1	1	0.84
12	0.75	0.75	0.75	1	0.75	1	0.75	0.75	0.75	0.75	0.75	0.5	0.25	0.75	0.75	1	1	0.9
13	0.5	0.75	0.75	0.5	0.5	0.75	0.75	0.75	0.75	0.75	0.5	0.75	0.25	0.5	0.25	0.75	0.5	0.64
14	0.75	0.75	1	1	1	1	1	1	0.75	0.75	0.75	1	0.75	1	1	1	0.75	1
15	1	1	1	1	1	1	1	1	1	1	1	1	0.75	1	0.5	1	1	1
16	0.75	1	1	0.75	1	1	1	1	1	1	1	1	0.5	1	1	1	0.75	1
$Q^*(A_{ij})$	0.73	0.73	0.81	0.69	0.73	0.88	0.8	0.78	0.73	0.84	0.83	0.88	0.69	0.8	0.69	0.86	0.84	$Q^*_e(C) = 0.8743$
$Q^*_e(B_i)$	0.82					0.93				0.89						0.9		

Evaluation interval $[x_0, x_1] = [1, 5]$

Color scale

1	1.4	1.8	2.2	2.6	3	3.4	3.8	4.2	4.6	5
0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1

Empirical evaluation score $Q^*_e(C)$

$Q^*_e(C) = 0.874335$

Asymptotic confidence intervals $[q^*_{e,0}, q^*_{e,1}]$ for $Q_e(C)$ at confidence level $1 - \alpha = 0.90, 0.95, 0.99$ and sample standard deviation σ^*_e with $\sigma^*_e = \sqrt{\frac{1}{n-1}\sum_{k=1}^{n}(Q^*_{e,k}(C) - Q^*_e(C))^2}$.

$1-\alpha$	$q^*_{e,0}$	$Q^*_e(C)$	$q^*_{e,1}$	σ^*_e
0.90	0.8244	0.8743	0.9243	0.1215
0.95	0.8148		0.9339	
0.99	0.7961		0.9526	

Sample size $n = 16$

Figure 12. The evaluation reports of video content

The SURE model delivered four different scores after data processing.

- First one is general evaluation score.
    - $Q^*_e(C) = 0.87$

  The result of SURE data processing shows general evaluation score as 0.87. If transfer it to percent (maximum is 100%) the evaluation result can be explained as the 87% succeeded by responses data.

- Second result is scores for key goals.
    - $Q^*_e(B_1) = 0.82$;
    - $Q^*_e(B_2) = 0.93$;
    - $Q^*_e(B_3) = 0.8$;
    - $Q^*_e(B_4) = 0.9$.

These scores show how good reached targets for key goals. Best score received the fourth key goal and worst one is third key goal. But all scores are reached its target as over 80%.

- Third result is scores for sub goals.
  - $Q^*(A_{11}) = 0.73$;
  - $Q^*(A_{12}) = 0.73$;
  - $Q^*(A_{13}) = 0.81$;
  - $Q^*(A_{14}) = 0.69$;
  - $Q^*(A_{15}) = 0.73$;
  - $Q^*(A_{21}) = 0.88$;
  - $Q^*(A_{22}) = 0.8$;
  - $Q^*(A_{23}) = 0.78$;
  - $Q^*(A_{24}) = 0.73$;
  - $Q^*(A_{31}) = 0.84$;
  - $Q^*(A_{32}) = 0.83$;
  - $Q^*(A_{33}) = 0.88$;
  - $Q^*(A_{34}) = 0.69$;
  - $Q^*(A_{35}) = 0.8$;
  - $Q^*(A_{36}) = 0.69$;
  - $Q^*(A_{41}) = 0.86$;
  - $Q^*(A_{42}) = 0.84$.

  These scores are show success of sub goals. Best scores received the sub goals A_{21} and A_{33}. Worst scores are linked to sub goals A_{34} and A_{36}.

- Fourth result is evaluation score of each participant in the evaluation process.
  - $k_1 = 0.67$;
  - $k_2 = 0.87$;
  - $k_3 = 0.74$;
  - $k_4 = 1$;
  - $k_5 = 1$;
  - $k_6 = 0.79$;
  - $k_7 = 0.93$;
  - $k_8 = 0.78$;
  - $k_9 = 0.93$;
  - $k_{10} = 0.91$;
  - $k_{11} = 0.84$;
  - $k_{12} = 0.9$;
  - $k_{13} = 0.64$;
  - $k_{14} = 1$;
  - $k_{15} = 1$;
  - $k_{16} = 1$;

These scores are show evaluation result of each student. In total 16 students are taking part of this evaluation process. 5 of 16 students evaluated of video content with maximum score 1. Two students evaluated with most worst scores: 0.64 and 0.67.

4. APPLICATION EXAMPLE

The offering guidance was applied to teaching process. Students (in future teachers) prepared video contents following giving guidance.The 3rd semesterstudents of the Informatics class were divided into 5 groups and made video content on a specific topic.

Table 3. Video content topics

Group number and video content topics
Group 1: Data, information and knowledge
Group2: Multimedia
Group 3: Database
Group 4: Turtle Graph
Group 5: Types of information systems

Teams created video content on selected topics. The purpose of the topic was defined according to the instructions and a storyboard was created (Figure 13).

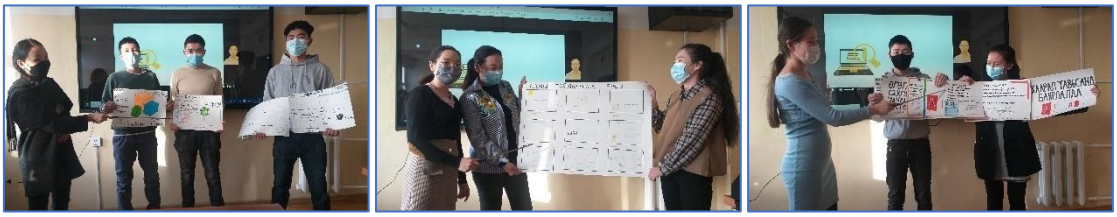
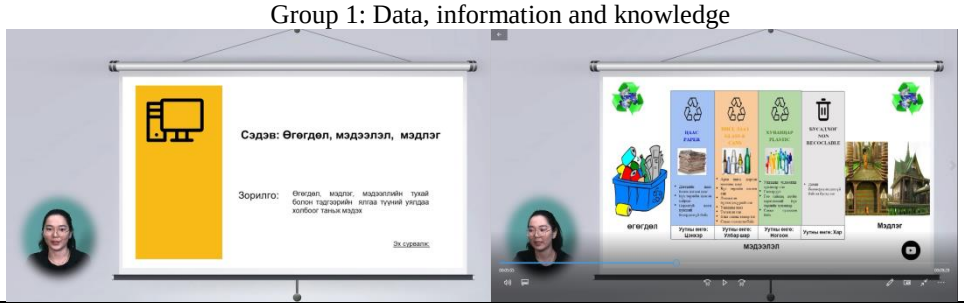


Figure 13.Introducing the storyboard

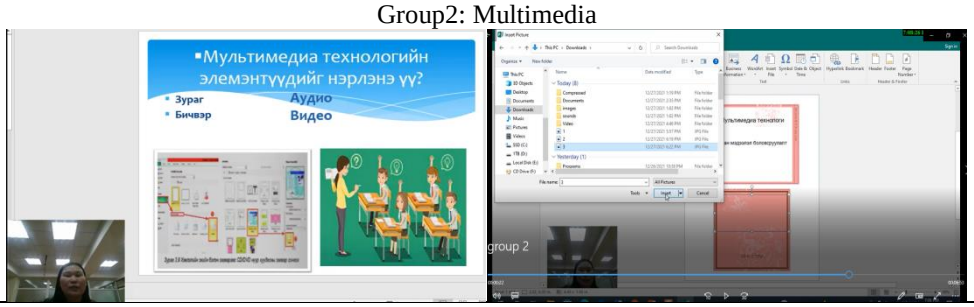
The video content was selected from the Typology of Video Production Styles(Figure 5).The developed video content was presented to other teams during the lesson and evaluated on its own and independently (Figure 13).

The video content of the teams is shown below.

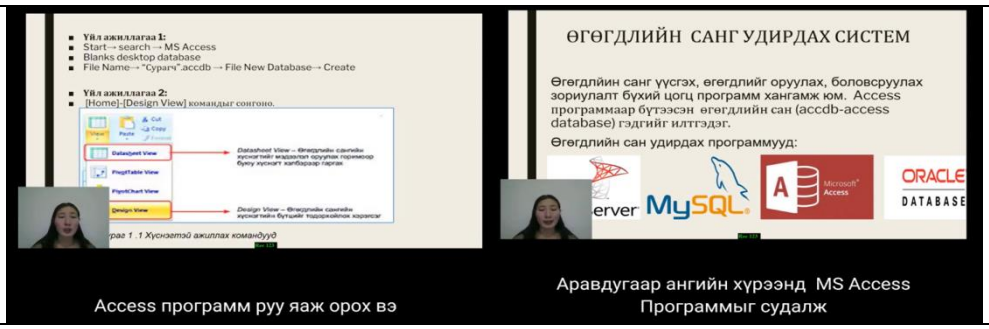
Group 1: Data, information and knowledge



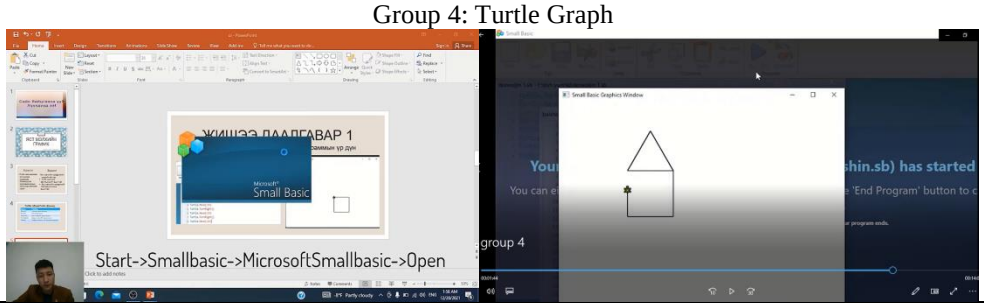
Group2: Multimedia



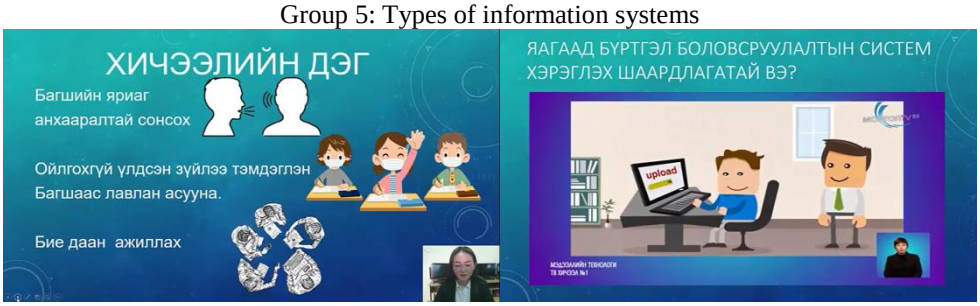
Group 3: Database



Group 4: Turtle Graph



Group 5: Types of information systems



5. CONCLUSIONS

During a pandemic, there is a need for a blendedlearning activities. Therefore, the study of video content development methodology is considered to be timely. This paper suggests that video content can be developed according to guidelines in the preparation, development, and evaluation phases, and that the video content can be evaluated using the SURE assessment model.

Students work with small groups to develop video content, introduce it to each other, and share experiences. The video content was evaluated according to a checklist developed by the teacher, and the results were analyzed using the SURE assessment model. The assessment is done twice. It can improve the quality of video content and create good video content.

Using this guidance, teachers can gain sufficient experience and skills to work with video content.

REFERENCES

[1] UNESCO, I. (2013) *Glossary of Curriculum Terminology.* Geneva: (UNESCO-IBE).
[2] Seel, N. M. (2012) *Encyclopedia of the sciences of learning.* London-New York: Springer.
[3] Selviandro, N., & Hasibuan, Z. A. (2013) *Cloud-Based E-Learning: A Proposed Model and Benefits by Using E-Learning Based on Cloud Computing for Educational Institution.* In: Mustofa K., Neuhold E.J., Tjoa A.M., Weippl E., You I. (eds) Information and Communication Technology. ICT-EurAsia 2013. Lecture Notes in Computer Science, vol 7804. Springer. Berlin, Heidelberg. doi:https://doi.org/10.1007/978-3-642-36818-9_20

[4] The economic times. (2022) Retrieved from https://economictimes.indiatimes.com/definition/e-learning

[5] Lizcano, D., Lara, J. A., & White, B. e. (2020) Blockchain-based approach to create a model of trust in open and ubiquitous higher education. *Journal of Computing in Higher Education, 32*, pp109–134. doi:https://doi.org/10.1007/s12528-019-09209-y

[6] Adekola, J., & Dale, V. (2019) *Development of an institutional framework to guide transitions into enhanced blended learning in higher education.* Research in Learning Technology, 25, 16. doi:https://doi.org/10.25304/rlt.v25.1973

[7] Kong, S. C. (2021) *Delivery and evaluation of an e-Learning framework through computer-aided analysis of learners' reflection text in a teacher development course.* RPTEL 16, 28. doi:https://doi.org/10.1186/s41039-021-00172-w

[8] Clements, M. D., & Cord, B. A. (2013) *Assessment guiding learning: developing graduate qualities in an experiential learning programme.* Assessment and Evaluation in Higher Education, 38(1), pp114–124.

[9] NC. (2010) *Transitioning to Online Assessment in North Carolina.* The North Carolina State Board of Education, NC.

[10] Ripley, M. (2009) *Transformational Computer-based Testing.*In: Scheuermann, F., Björnsson, J. (eds.), Reykjavik, Iceland.

[11] Conole, G., & Warburton, B. (2011) *A review of computer-assisted assessment.*ALT-J 13(1), pp17–31.

[12] Mora, M. C., Sancho-Bru, J. L., Iserte, J. L., & Sánchez, F. T. (2012) *An e-assessment approach for evaluation in engineering overcrowded groups.* Computers and Education, 59, pp732–740.

[13] Mueller, J. (2014) *Authentic assessment toolbox.* North Central College, Naperville. Retrieved from http://jfmueller.faculty.noctrl.edu/toolbox/whydoit.htm

[14] Gaytan, J., & McEwen, B. C. (2007) "Efective online instructional and assessment strategies",*American Journal of Distance Education*(21(3)), pp117–132. doi:https://doi.org/10.1080/08923640701341653.

[15] Jones, D. R. (2011) Academic dishonesty: Are more students cheating? *Business Communication Quarterly, 74(2)*, pp141–150. doi:https://doi. org/10.1177/1080569911404059.

[16] McCann, A. L. (2010) Factors afecting the adoption of an e-assessment system. *Assessment & Evaluation in Higher Education, 35(7)*, pp799–818. doi:https://doi.org/10.1080/02602930902981139

[17] Noguera, I., Guerrero-Roldan, A. E., & Rodríguez, M. E. (2017) Assuring authorship and authentication across the e-assessment process. *In Proceedings of the Technology Enhanced Assessment, TEA 2016 (pp. 86–92)*. doi:https://doi.org/10.1007/978- 3-3

[18] Underwood, J., & Szabo, A. (2003) Academic ofences and e-learning: Individual propensities in cheating. *British Journal of Educational Technology, 34(4)*, 467–478. doi:https://doi.org/10.1111/1467- 8535.00343.

[19] Jisc. (1993) *Joint information systems committee*. Retrieved from https://www.jisc.ac.uk

[20] Muravyeva, E., Janssen, J., Dirkx, K., & Specht, M. (2019) Students' attitudes towards personal data sharing in the context of e-assessment: Informed consent or privacy paradox? *In Proceedings of the 2018 International Technology Enhanced Assessment Conference, TEA 2018*, (pp. 16–26). Amsterdam, The Netherlands.

[21] Means B, T. Y. (2010) *Evaluation of Evidence-Based Practices in Online Learning: Meta-Analysis and Review of Online Learning Studies.* Washington, DC: US Department of Education.

[22] Schmid RF, B. R. (2014) *The effects of technology use in postsecondary education: a meta-analysis of classroom applications.* Comput Educ.

[23] Allen W, A. S. (2012) *Effects of video podcasting on psychomotor and cognitive performance, attitudes and study behavior of student physical therapists.* Innov Educ Teach Int.

[24] Kay R, H. (2012) *Exploring the use of video podcasts in education: a comprehensive review of the literature.* Comput Human Behav.

[25] Lloyd S, A. R. (2012) *Screencast tutorials enhance student learning of statistics.* Teach Psychol.

[26] Rackaway C. (2012) *Video killed the textbook star? Use of multimedia supplements to enhance student learning.* J Pol Sci Educ.

[27] Hsin W, J. C. (2013) *Short videos improve student learning in online education.* J Comput Sci Coll.

[28] Stockwell B, R. S. (2015) *Blended learning improves science education.* Cell.

[29] Vyond Team, (2021), "How to Make an Instructional Video: 25 Essential Tips", Online available: https://www.vyond.com/resources/25-tips-create-engaging-instructional-videos/

[30] Gretchen Vierstra, (2022) “Teacher videos: 5 reasons why making your own videos can help with distance learning”, Online available: https://www.understood.org/articles/en/teacher-videos-5-reasons-why-making-your-own-videos-can-help-with-distance

[31] Patrick Lowenthal, Richard West, Leanna Archambault and Jered Borup, (2020) “Engaging Students Through Asynchronous Video-Based Discussions in Online Courses”, Online available: https://er.educause.edu/articles/2020/8/engaging-students-through-asynchronous-video-based-discussions-in-online-courses

[32] Peter Fadde and Phu Vu, (2014) "Blended Online Learning: Benefits, Challenges, and Misconceptions," in Online Learning: Common Misconceptions, Benefits and Challenges, eds. Patrick R. Lowenthal, Cindy York, and Jennifer Richardson (Hauppauge, NY: Nova Science Publishers, 2014), pp33–48.

[33] Rahmatika, Munawir Yusuf, Leo Agung, (2021) “The Effectiveness of Youtube as an Online Learning Media“, Journal of Education Technology. Vol. 5(1) pp152-158.

[34] B.D. Coller, M.J. Scott, (2009) “Effectiveness of using a video game to teach a course in mechanical engineering”, Computers & Education, Volume 53, Issue 3, 2009, Pages 900-912, ISSN 0360-1315, https://doi.org/10.1016/j.compedu.2009.05.012.

[35] Peter D. Wiens, Kevin Hessberg, Jennifer LoCasale-Crouch, Jamie DeCoster, (2013) “Using a standardized video-based assessment in a university teacher education program to examine preservice teacher’s knowledge related to effective teaching”, Teaching and Teacher Education, Volume 33, 2013, Pages 24-33, ISSN 0742-051X, https://doi.org/10.1016/j.tate.2013.01.010.

[36] Zaneldin E, Ahmed W, El-Ariss B. (2019) Video-based e-learning for an undergraduate engineering course. E-Learning and Digital Media.16(6):475-496. doi:10.1177/2042753019870938

[37] Sarah McKibben (2014) Showing Videos in the Classroom: What’s the Purpose? Education Update newsletter. ASCD.

[38] Hansch, A., Newman, C., Hillers, L., Shildhauer, T., McConachie, K., & Schmidt, P. (2015) Video and online learning: Critical reflections and findings from the field. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2577882

[39] UranchimegTudevdagva: Structure Oriented Evaluation Model for E-Learning. Wissenschaftliche Schriftenreihe Eingebettete Selbstorganisierende Systeme, Universitätsverlag Chemnitz, Chemnitz, Germany, July 2014. 123 p., ISBN: 978-3-944640-20-4, ISSN: 2196-3932.

[40] UranchimegTudevdagva, Wolfram Hardt, A new evaluation model for eLearning programs, Technical Report CSR-11-03. Chemnitz, 2011.

[41] UranchimegTudevdagva, W. Hardt, E. Tsoy, and M. Grif, New Approach for E-Learning Evaluation. In Proceedings of the 7th International Forum on Strategic Technology 2012, September 17-21, 2012, Tomsk, Russia, pp712-715.

[42] UranchimegTudevdagva, and W. Hardt, A measure theoretical evaluation model for e-learning programs. In Proceedings of the IADIS on e-Society 2012, March 10-13, 2012, Berlin, Germany, pp.44-52.

[43] Phillips, P. P. et al., (2010) ASTD Handbook of Measuring and evaluating training. Alexandria, VA: ASDT.

[44] UranchimegTudevdagva, 2020 “Structure-Oriented Evaluation an Evaluation Approach for Complex Processes and Systems”, Gewerbestrasse 11, 6330 Cham, Switzerland, Springer, pp92, ISBN 978-3-030-44805-9 ISBN 978-3-030-44806-6 (eBook), https://doi.org/10.1007/978-3-030-44806-6.

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