The Study of Affective Value in Educational Video Production Style Using Kansei Engineering Method

Nur Faraha Bte Hj. Mohd. Naim, and Ag. Asri Ag. Ibrahim

***Abstract*—This paper presents the emotional responses among higher institution learners towards the production style of an educational video. The video design concepts for each production style were categorized into three sections, non-linear video with visual effects (interactive video mobile-learning), linear video with visual effects (green screen) and linear video with no visual effects (screencast). The Kansei Engineering approach was used to measure the learners' emotion reaction on each of the production style. Through Kansei Engineering method, the outcomes presented variance of active and passive emotion reaction towards the production style, difference feelings responses caused by the video design, whereas at the end most learners agreed that the inclusion of interactivity and aesthetics in video design will increase their motivation to learn from the educational video.**

***Index Terms*—Educational videos, video design, production style, Kansei engineering, affective value, mobile-learning.**

I. Introduction

The educational video is used as a secondary medium for instructors to deliver an audio-visual education and tutorials to learners. It is an essential operative in teaching and learning (T&L) as an alternative medium to leverage learners' affective value. With the existence of online video platform such as YouTube, deploying the educational videos to learners has become much easier, and the educational videos are accessible for learners. According to Kaur in the New Straits Times website, Google Survey stated YouTube is a popular platform for Malaysian to watch the online videos in comparison to other nation [1]. Thus, educational video deployment through the YouTube platform is multiplying over time.

A. Educational Video Production Style

Concerning on the production style of educational video, Vieira, Lopes, and Soares stated that the video interface with significant value in pedagogy goal and creative utilization of the educational video can strongly motivate learners to embrace knowledge [2]. Hansch, Hillers, McConachie, Newman, Schildhauer, and Schmidt agreed with Vieira et al. that the pedagogy goal can be influenced by visual aesthetics and production value of a video though depending on the production styles and capability [3]. Fitzgibbon mentioned about the 'interactive-video-conferencing' will not be effective if there is no proactive plan from the instructor [4]. Therefore, in retrospect to the above statements, the production style of a video should be considered in a video design to influence the affective value.

Affective value reflects on the aspect of learners' feelings about the production style of an educational video. The way learners' emotions responded when utilizing the educational videos can be varied based on the differences in production style. Vieira et al. issued the video design consideration based on the feedback from learners, such as making short videos, avoid the abrupt video transitions, provide interactive links and highlights, summarize the contents and create click access to the important parts [2]. Denning stressed on the oversimplification or excessive use of visual effects on videos are the imperative components to look at [5]. The goal of examining the affective value is to scale down the lack of enthusiasm and heighten the devotion in self-learning among the learners through emotions as motivation.

Production style can be in the form of linear video and non-linear video based on the video design aspect. Brame pointed out the cognitive load, engagement, and active learning as elements needed in designing an educational video. He stated that the segmentation into short videos (chunk information) could optimize the cognitive load and encourage students to stay engaged, furthermore, applying interactive features in a video can create active learning among learners [6]. The video length should be a factor in educational video production since the video length impacted learners' consideration to stay engaged with the video [7]. Thus, by segmenting the video in the timeline through time points feature may heighten the positive emotions.

Foremost, careless video design can yield to negative response and dissatisfaction among learners. Referring to Kies, Williges, and Rosson, low satisfaction on educational video will decrease students' enthusiasm in learning, thus, impact on students' attrition rate [8]. Therefore, finding the learners' reaction through their emotion is prudent to measure the response of the feelings (affective value) in production style. Two problems may cause disengaged among learners – the video arrangement and visual aesthetics in a production style.

A nationwide survey was conducted in 2018 by Kaltura about the prospect of interactive video possibly will play an important role in the forthcoming education, with 97% of respondents' feedbacks reported agreed [9]. An experiment was conducted during the laboratory sessions where the students watch the video tutorial through iPads, the way they behaved shows that as if they were searching for the convenience and the availability of interactive feature in a video [10]. Thereof, an educational video for higher institutions needs to be engaging and attractive enough for

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learners to stay tuned and utilize the video as their alternative method to studies. Hence, the thereof thought leads to finding the exact sensibility of production style that can evoke feelings engagement as central motivation to self-learning when using the video.

B. Kansei Engineering Approach

The feelings measurement can be done through the Kansei Engineering Approach, a method that is known to be widely used to measure human psychology feelings. Mitsuo Nagamachi explained that Kansei Engineering is a translating technology that conveys consumers emotions as a criterion for product design [11]. METI refers to Kansei Engineering as 'commitment' and 'consideration' values given by the manufactures to the users that cause the users to appreciate the product even more [12]. Levy stated that Kansei Engineering (KE) has commanded numerous market success, product research disciplines, and innovations [13]. It is because that KE create products and designs that satisfy users by assimilating human psychological feelings into design elements. Aside from the marketing aspect, Kansei Engineering can be used as a tool to facilitate the instructional designers in designing their learning materials that could evoke positive emotions [14]. Hazlina Adnan and Fauziah Redzuan used the Kansei Engineering method to assert the design elements in video-based learning materials on YouTube that could elicit students' emotions. They manage to find 5 pillars of Kansei semantic space of emotions; professional-motivated, fun, joking-humorous, deceptive and puzzled, confirming the e-learning video can elicit specific emotions based on these pillars for design elements in video-based learning materials [15]. Sakhllah Zubir and Fauziah Redzuan expand the study of design elements using the Kansei engineering on mobile-learning and found 5 pillars that are fun-motivated, learnable, challenging, preoccupied and engaged [16].

The motivation of this research study is to assess the significance of educational video production style toward learners' engagement. Hence, the Kansei Engineering methodology is used to discover the correlation between human emotion (affective value) and production style. The production style divided into three sections; non-linear video with visual effects (interactive video mobile-learning), linear video with visual effects (green screen) and linear video with no visual effects (screencast). The learners' feeling could be dissimilar and varied in proportion to the distinctive video design concept.

II. Methodology

The experiment was conducted in a class with one hundred and fifty college and university students as the respondents. The one hundred and fifty students were then divided into three groups (Group A, Group B, and Group C) to test the products. Each of the group consists of fifty students. As samples for this experiment, three production style – Product A: Pocket IVML is a combination of Green Screen, Animation and Screencast (non-linear video with visual effects) will be used in Group A, Product B: Green Screen (linear video with visual effects) will be used in Group B and Product C: Screencast (linear video with no visual effects) will be used in Group C

All these samples from each group were used to extract the emotional responses from students. Fig. 1 shows the affective value treatment. The statistic package used in analysing the data are Factor Analysis (KMO), PCA Extraction Method (Communalities Analysis), SPSS Descriptive Statistics (Frequencies), and One-Way ANOVA.

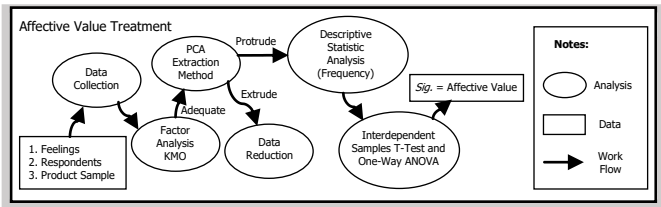
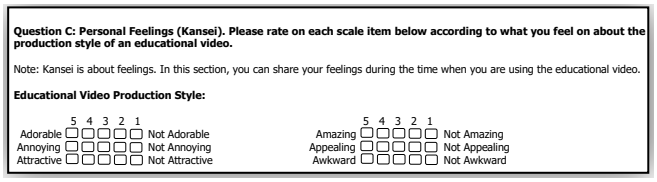


Fig. 1. Module analytical technique design framework.

The measurement of 1 to 5 rating scale for each emotion indicates how they felt about the production style as shown in Fig. 2 below.



Question C: Personal Feelings (Kansei). Please rate on each scale item below according to what you feel on about the production style of an educational video.

Note: Kansei is about feelings. In this section, you can share your feelings during the time when you are using the educational video.

Educational Video Production Style:

	5	4	3	2	1			5	4	3	2	1	
Adorable	☐	☐	☐	☐	☐	Not Adorable	Amazing	☐	☐	☐	☐	☐	Not Amazing
Annoying	☐	☐	☐	☐	☐	Not Annoying	Appealing	☐	☐	☐	☐	☐	Not Appealing
Attractive	☐	☐	☐	☐	☐	Not Attractive	Awkward	☐	☐	☐	☐	☐	Not Awkward

Fig. 2. Feelings measurement in Kansei methodology.

III. Analytical Techniques

A. Data Reduction Using Kaiser-Meyer-Olkin (KMO)

Table I, II and III denotes the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test Results. The KMO was used to test the data sample and verify adequacy value within the variables. The correlation range of KMO is between 0 to 1 value. The considerably adequate variable value for KMO correlation is above 0.60 - 0.70, which indicated that the Factor Analysis is appropriate and acceptable for these data [17]. Any value that is below or equal to 0.5 is considered as poor and should be removed from the list whilst the value closest to 1 is considered as good data.

The Communalities Factor Analysis in Data Reduction SPSS was used to measure and analyse the potential emotional factors. The communalities range is from 0 to 1 where the value 1 is inferring to high variance whilst the 0 value infers to no variance in variables. The communalities are consisting of initial and extraction where the initial value was assumed as 1 and the extraction is the variance number that the extraction of the variable is made. Hence, if the extraction value is equal to or less than 0.5 in which depicted as low communalities, then the variable should be removed from the analysis.

- **Potential Emotion Factors for Product A: IVML (Non-Linear Video with Visual Effects)**

Based on Kaiser recommendation, the value between 0.50 to 0.70 are considered average [18] and the KMO and Bartlett's Test significance value must below 0.05 for correlated variables happened. In Communalities Extraction Method: Principal Component Analysis, any variables that

are less than 0.5 are considered as low communalities and should be dropped from the analysis, however, for this KMO test all feelings variables are adequate. Referring to Table I, the KMO test is 0.681 for Product A: IVML (Non-Linear Video with Visual Effects), therefore, the feelings variables used for the test are moderately adequacy.

TABLE I: KMO AND BARTLETT'S TEST FOR PRODUCT A: IVML (NON-LINEAR VIDEO WITH VISUAL EFFECTS)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.681
Bartlett's Test of Sphericity	Approx. Chi-Square	765.235
	Df	300
	Sig.	.000

- **Potential Emotion Factors for Product B: Green Screen (Linear Video with Visual Effects)**

Referring to the Table II below, the KMO test is 0.666 for Product B: Green Screen (Linear Video with Visual Effects) and the *p-value* is less than 0.001 is highly significant, therefore, the feelings variables used for the test are moderately adequacy. In Communalities Extraction Method: Principal Component Analysis, any variables that are less than 0.5 are considered as low communalities and should be dropped from the analysis, however, for this KMO test all feelings variables are adequate.

TABLE II: KMO AND BARTLETT'S TEST FOR PRODUCT B: GREEN SCREEN (LINEAR VIDEO WITH VISUAL EFFECTS)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.666
Bartlett's Test of Sphericity	Approx. Chi-Square	635.792
	Df	300
	Sig.	.000

- **Potential Emotion Factors for Product C: Screencast (Linear Video with No Visual Effects)**

Referring to the Table III, the KMO test is 0.665 for Product C: Screencast (Linear Video with No Visual Effects) and the *p-value* is less than 0.001 is highly significant, therefore, the feelings variables used for the test are moderately adequacy. In Communalities Extraction Method: Principal Component Analysis, any variables that are less than 0.5 are considered as low communalities and should be dropped from the analysis, however, for this KMO test all feelings variables are adequate.

TABLE III: KMO AND BARTLETT'S TEST FOR PRODUCT C: SCREENCAST (LINEAR VIDEO WITH NO VISUAL EFFECTS)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.665
Bartlett's Test of Sphericity	Approx. Chi-Square	754.131
	Df	300
	Sig.	.000

B. *Descriptive Statistics: Frequencies*

Following are the results of descriptive analysis frequencies extracted from students for the three production styles of educational videos - Product A: Pocket IVML (non-linear video with visual effects), Product B: Green Screen (linear video with visual effects) and Product C: Screencast (linear video with no visual effects).

- **Product A: Pocket IVML (Non-Linear Video with Visual Effects):**

Table IV denotes positive emotional responses from students. The results justify that this type of production style almost succeeded in stimulating the positive feelings among the students involved, with two out of twenty-five feelings have resulted in Moderate level, thus, confirming a positive influence of affective value in Product A: Pocket IVML (Non-Linear Video with Visual Effects).

TABLE IV: PRODUCT A – POCKET IVML (NON-LINEAR VIDEO WITH VISUAL EFFECTS)

Results Generated from Descriptive Analysis Frequency				
Types of Feelings	**Level**	**Frequency of Respondents**	**Total Rating Scale**	**Mean Value (N)**
Annoying	Not Annoying	28	89	1.78
Appealing	Almost Appealing	21	181	3.62
Attractive	Almost Attractive	23	191	3.82
Awkward	Not Awkward	19	117	2.34
Boring	Not Boring	22	105	2.10
Convenient	Almost Convenient	19	184	3.68
Comfortable	Almost Comfortable	25	195	3.90
Comprehended	Almost Comprehended	17	174	3.48
Confusing	Not Confusing	16	124	2.48
Cool	Almost Cool	20	199	3.98
Creative	Creative	24	216	4.32
Fun	Almost Fun, Fun	19 19	204	4.08
Impressive	Almost Impressive	19	201	4.02
Interesting	Interesting	26	216	4.32
Irritating	Moderate	19	130	2.60
Lost	Not Lost	20	106	2.12
Neat	Moderate	16	160	3.20
Necessary	Moderate, Almost Necessary, Necessary	16 16 16	195	3.90
Professional	Professional	23	211	4.22
Refreshing	Almost Refreshing, Refreshing	17 17	194	3.88
Satisfied	Almost Satisfied	20	191	3.82
Simple	Simple	21	201	4.02
Troublesome	Not Troublesome	25	101	2.02
User-Friendly	User-Friendly	26	210	420
Waste of Time	Not Waste of Time	31	91	1.82

- **Product B: Green Screen (Linear Video with Visual Effects)**

Table V shows the counterbalance of 'being neutral to positive emotion' responses from students. The results justify that this type of production style does not quite manage to trigger positive feelings among the students involved as the felt a bit more inclined to feeling moderate, with thirteen out of twenty-five feelings have resulted in Moderate level, thus, confirming the less influence of affective value in Product B: Green Screen (Linear Video with Visual Effects).

TABLE V: PRODUCT B – GREEN SCREEN (LINEAR VIDEO WITH VISUAL EFFECTS)

Results Generated from Descriptive Analysis Frequency				
Types of Feelings	**Level**	**Frequency of Respondents**	**Total Rating Scale**	**Mean Value (N)**
Annoying	Not Annoying	16	111	2.22
Appealing	Moderate	24	173	3.46
Attractive	Moderate	23	170	3.40
Awkward	Moderate	17	117	2.34
Boring	Less Boring	17	114	2.28
Convenient	Moderate	23	167	3.34
Comfortable	Almost Comfortable	20	191	3.82
Comprehended	Moderate	24	158	3.16
Confusing	Moderate	17	133	2.66
Cool	Almost Cool	20	187	3.74
Creative	Moderate	18	184	3.68
Fun	Moderate	17	176	3.52
Impressive	Moderate	21	175	3.50
Interesting	Interesting	19	200	4.00
Irritating	Moderate	22	129	2.58
Lost	Less Lost	16	112	2.24
Neat	Moderate	21	154	3.08
Necessary	Almost Necessary	19	189	3.78
Professional	Almost Professional	23	201	4.02
Refreshing	Moderate	21	178	3.56
Satisfied	Almost Satisfied	20	174	3.48
Simple	Almost Simple	16	190	3.80
Troublesome	Moderate	16	106	2.12
User-Friendly	User-Friendly	19	196	3.92
Waste of Time	Not Waste of Time	22	108	2.16

- **Product C: Screencast (Linear Video with No Visual Effects)**

Table VI shows almost the same results with Product B, though this type of production style did receive a tad off balance of 'moderate' response from students, in which is a bit higher compared to Product B's outcome. Even so, the results still justify that this type of production style also does not quite so manage to trigger the positive feelings among the students involved as they also almost inclined to feel moderate, with sixteen out of twenty-five feelings have resulted in Moderate level, thus, confirming the average influence of affective value in Product C: Screencast (Linear Video with No Visual Effects).

TABLE VI: PRODUCT C- SCREENCAST (LINEAR VIDEO WITH NO VISUAL EFFECTS)

Results Generated from Descriptive Analysis Frequency				
Types of Feelings	**Level**	**Frequency of Respondents**	**Total Rating Scale**	**Mean Value (N)**
Annoying	Less Annoying	17	107	2.14
Appealing	Moderate	18	163	3.26
Attractive	Moderate	23	162	3.24
Awkward	Moderate	20	134	2.68
Boring	Moderate	18	139	2.78
Convenient	Moderate	22	177	3.54
Comfortable	Moderate	24	178	3.56
Comprehended	Moderate	32	155	3.10
Confusing	Moderate	19	145	2.90
Cool	Almost Cool	19	189	3.78
Creative	Almost Creative	22	186	3.72
Fun	Less Fun	13	157	3.14
Impressive	Almost Impressive	16	181	3.62
Interesting	Almost Interesting, Interesting	14 14	180	3.60
Irritating	Moderate	25	145	2.90
Lost	Moderate	20	125	2.50
Neat	Moderate	26	156	3.12
Necessary	Moderate	18	175	3.50
Professional	Professional	19	200	4.00
Refreshing	Moderate	20	160	3.20
Satisfied	Moderate	21	173	3.46
Simple	Simple	16	188	3.76
Troublesome	Moderate	21	126	2.52
User-Friendly	Moderate	15	175	3.50
Waste of Time	Not Waste of Time	27	94	1.88

IV. HYPOTHESIS RESULTS

The One-Way ANOVA was used to analyse the condition of mean value between Product A, Product B, and Product C. The reason of analysing using the One-Way ANOVA is to determine the significant difference in the mean condition between the product groups and support the hypothesis. Referring to the One-Way ANOVA, the *sig. value* between Product A, Product B, and Product C is 0.121 in which the value is far greater than the standard significance of 0.05, hence the probability of something occurred is by chances and not because of independent variable's manipulation. The mean condition of Affective Value: Product A (M = 3.35), Product B (M = 3.19), Product C (M = 3.18) and the N = 150 respondents. M is the Mean value and N is the total number of respondents.

The $H0_x$ is Null Hypothesis while $H1_x$ is the Alternative Hypothesis. The *p-value* in One-Way ANOVA is a probability of frequent occurrence with 0.05 is the standard number of *sig.* value. If the *p-value* is equal or less than 0.05, the value depicted that there is a statistically significant difference in mean condition between the Product A, Product B, and Product C, whereas, if the *p-value* is more than 0.05, the value depicted that there is no statistically significant difference between the three products. Hence the difference Mean value is likely altered due to chances and not by manipulation.

Hypothesis A: Affective Value in Production Style

$H0_1$: Affective value based on students' feelings were not affected in response to the production style.

$H1_1$: Affective value based on students' feelings were affected in response to the production style.

TABLE VII: ANALYSIS RESULTS

			Sig.
Pair 1	Product A: IVML	Product B: Green Screen	0.215
		Product C: Screencast	0.147
Pair 2	Product B: Green Screen	Product A: IVML	0.215
		Product C: Screencast	0.978
Pair 3	Product C: Screencast	Product A: IVML	0.147
		Product B: Green Screen	0.978

Following the analysis results generated above in Table VII, the Pair 1 *sig. value* = 0.215 between Product A: IVML

condition and Product B: Green Screen condition, whereas the *sig. value* = 0.147 between the Product A: IVML condition and Product C: Screencast condition. The Pair 2 *sig. value* = 0.215 between Product B: Green Screen condition and Product A: IVML condition, whereas the *sig. value* = 0.978 between Product B: Green Screen condition and Product C: Screencast condition. The Pair 3 *sig. value* = 0.147 between Product C: Screencast condition and Product A: IVML condition, whereas the *sig. value* = 0.978 between Product C: Screencast condition and Product B: Green Screen condition. All the three pairs mentioned thereof produce results where the *p-values* have a greater amount than the standard significance level of 0.05 value. Since the *Sig. value* > 0.05 then the results conclude that there is no statistical difference between the Mean number of the three production styles. Hence, the Alternative Hypothesis [$H1_1$] is rejected and Null Hypothesis [$H0_1$] is accepted wherein the Affective Value based on students' feelings were not affected in response to the production style. The variance of a mean condition in feelings is likely due to chances and not because of production style impact. In other words, the students happened to be more positively inclined toward Product A: IVML (Non-Linear with Visual Effects) in comparison with the other two products.

Though the One-Way ANOVA presented the mean condition of students' feelings response occurred are by prospects, however, the Product A: IVML (Non-Linear with Visual Effects) production style could encourage and motivate students to self-determined learning. According to the Descriptive Statistics Analysis Frequencies results, most students feel motivated to utilize the educational video if instructors considered the aesthetic value of visual design and the provide feature to select the topic (non-linear) within one single video timeline.

V. Conclusion

Finally, it can be concluded that the students have diverse feelings response concerning affective value perspective toward educational video production style. To sum up, producing an educational video with a non-linear video sequence and aesthetic visual design concept manage to generate an active and positive emotional response from the students. Three different production styles were used in the test, Product A: IVML (Non-Linear with Visual Effects), Product B: Green Screen (Linear with Visual Effects) and Product C: Screencast (Linear with No Visual Effects). Through the Kansei Engineering method, the results concluded that students are more inclined to have a positive response toward Product A: IVML (Non-Linear with Visual Effects). This type of production style manages to trigger students' feelings and they are most responsive emotion stimulation when compared to the other two groups of respondents under Product B: Green Screen (Linear with Visual Effects) and Product C: Screencast (Linear with No Visual Effects). The study also shows that 105 students out of 150 students feel positively motivated if the aesthetic value is included in video design whilst 45 students remain passive. And compared to the traditional linear video style, although the 46 students' feelings were passive even if the control to jump from one topic to another in one single video timeline are featured, however, there are 106 students out of 150 students feel positively motivated. Foremost, the findings reveal the probabilities of correlation between learners' engagement feelings (affective value) and educational video production style, a context that has not yet been discussed.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Nur Faraha Bte Hj. Mohd. Naim conducted the research, analyzed the data and wrote the paper. Ag. Asri Ag. Ibrahim supervised, reviewed and approved the final version.

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