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MOOC Design Phase: Nominal Group Technique in Determining the MOOC Elements Using Relative Importance Index (RII)

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Abstract
This article discussed on how nominal group technique (NGT) helps to determine the elements in online learning environment via Massive Open Online Courses (MOOC) to be developed. The expert's perspective collected and processed using the scientific computational of Relative Important Index (RII) formula in relation of selection elements were presented and interpreted in the finding section. The determinant of agreement by experts in field of educational technology who make independent decision about the features of the MOOC were taken into consideration. It was found that the elements suggested were accepted as the design for MOOC with acceptable weight of RII value. through the determination of the essential elements developed in this design phase, then the researchers are able to develop a learning environment based on the agreed elements with high and accepted RII values.
Keywords: Mooc Design, Expert View, Relative Importance Index

Introduction

The design and development of quality education shared to the public form an unlimited online network globally (Norazah *et al.* 2018). The need for ICT integration in teaching and learning, requires transformation of teaching roles and implementation through continuous professional development to ensure that all instructors can leverage on technology for education (Gouws & Kritzinger, 2023; UNESCO, 2005) Everyone can access freely on any educational materials virtually. As a MOOC developed on Connectivism theory, the main idea is to provides an online learning environment that brings educators, learners, computers, reading materials, applications, audio and video interconnected and form a network, especially in education, where *learning and*

knowledge rest in diversity of opinion (Siemens, 2005; Downes, 2010). Conventional learning approaches have many constraints in terms of time, learning resources and limited communication space and less flexible learning approaches.

In education sector, teaching, learning and training have become very important in order to acquire a new skill, especially in delivering content of a lesson for learners. Most of educators are looking for an alternative learning and training method in order to support their demand to equip the new users with the necessary knowledge and skills based on their current education processes. Nevertheless, it has become very challenging to develop an efficient and effective learning task thus to ensure the engagement of the learners efficiently with the delivered content especially for virtual learning environment (VLE). Learners in the VLE demand highly effective and attractive learning task to reduce poor engagement and completion rate.

Therefore, the purpose of this study is to design and develop MOOC elements using Relative Important Index (RII) via the expert decision in nominal group technique. The comparison on several online teaching and learning elements from past researcher all over the world as illustrated in Table 1 were referred. All the elements were based on the sustainable quality educational design and development elements of educational activities. According to Langgulung (1989) education needs to consider physical, spiritual and mental aspects; where these three main elements were applied in the main theme of this study; Strategy, Method and Technique in the formation of an online learning environment. All elements were related to each other during designing stage. In summary, the preliminary elements in Table 1 and were discussed and scaled it by the selected experts.

Table 1
Analysis on online teaching and learning elements

Theme	**Element**		**Authors**
Strategies	Teacher Centered		Miranda *et al., 2021;* Alawamleh, 2020
	Students Centered		Nasri, 2019; Semper & Blasco 2018; Min & Nasir, 2020; Beckers, 2016
	Open Resources Centered		Bell 2011, Sandanayake 2019; Roddy *et al.* 2017; Pardino *et al.,* 2018; Wang & Wang, 2017
Methods	Application	Online Mind Map	Bhattacharya, & Mohalik, 2020; Abd Karim *et al.*, 2020
		Online 2D Animation	Nasri, 2020; Rahimi *et al.,* 2021; Ishak & Mushim 2019; Neta *et al.* 2020
		Online 3D Animation	Martzoukou, 2020; Anders, 2019; Abu Alatta & Momani 2021
		Online Multimedia	Zakaria & Khalid, 2016; Rosmiati & Siregar, 2021; Rubaai, & Hashim, 2021

	Social Media	Connecting platform	Mistar & Embi, 2016; Jun Xin *et al.,* 2021;
		Picture-video focused	Yunus & Salehi 2012; Hamdan *et al.,* 2015
		Video-upload platform	Shariff *et al.,* 2018; Block, 2009
		Social website or blog	Khalid 2014; Baharuddin & Mohamad 2020).
		Audio focused	Nigri (2020);
Techniques	Online Discussion		Hamzah et al., 2021; Abuhassna & Amin 2014
	Online Demonstration		Borton *et al.,* 2017
	Online Simulation		Gibbons *et al.,* 2021
	Online Roleplay		Warland & Smith 2012; Rahman & Angraeni, 2020

Online Teaching and Learning Strategies

Strategies in education refer to the wisdom effort of educator and developer to determine the efficient ways of planning method and techniques in a lesson in to meet the learning objectives (Bashah & Zulkifli, 2022). There are many strategies, sometime term approach is being used, that are often used by educator namely teacher-centralization strategy or teacher centered, facilitator centered, students-centered, and open resources centered.

Teacher Centered strategy makes educator plays a key role and control all teaching and learning activities during the educational process conducted (Miranda *et al., 2021*). Either online or face-to-face, teacher is focusing to deliver the important or basic of each knowledge to ensure the true and fact received by the students. This to avoid misunderstanding or misinterpretation on each subject matters (Alawamleh, 2020).

While in learner perspective, a strategy called *Students Centered* strategy makes learner to get involved actively in learning session. More time given to the students in exploring and solving problem with the help of educator (Nasri, 2019; Semper & Blasco, 2018). The communication pattern shows more actively between students-and-students compared to teacher-and-students. The educator or teacher gradually shift the key role and control to success the learning experience from his or herself to the students or participation. As students or participant progress, the respective facilitators fade more and more to ensure that learning process is control and conducting by learners (Beckers, 2016). In this approached, the educator practice democratic leadership patterns to ensure learners actively participate to build understanding through learning activities assigned. Students or participants are freely to ask question, and speak their mind (Min & Nasir, 2020).

As in social learning practice today, the *Open Resources Centered* strategy (Bell, 2011; AlDahdouh *et al.,* 2015) in connective environment give both educator and learner easily connect more effective in teaching and learning process (Siemens, 2005; Downes, 2010). The educational resources provided online makes teaching material shared

efficiently that may foster the self-reliance among the learners with-out the presence of the teacher or facilitator (Sandanayake, 2019; Roddy *et al.,* 2017; Pardino *et al.,* 2018; Ismail *et al.,* 2016). This strategy and approach are not new in the world of technology.

Online Teaching and Learning Method

Method in educational process refer to selection of ways, arrangements, or procedures of teaching. The is the important part in determining the appropriate method to be carried out. There are a lot of method suggested by past scholar in determining the teaching and learning method such as cooperative, collaborative, problem based and etc. Unfortunately, in this context the online method – application and social media that support teaching and learning process was discussed. The idea to used such apps and social media to supports educational process is an image of modernity. There are several applications and social media platform offered in the internet had been selected that mostly used by the educator in conducting their online educational activities.

Use of Application

The apps provided is an intermediary to supports teaching and learning activities that are developed in simple and easy-to-use by all so that the lesson can be disseminated efficiently (Reimers *et al.,* 2020; Cornock, 2020; Zakaria, 2018). That share of information about what information via apps can also increase student motivation. By increasing their motivation toward the method selected, the ultimate goal to share the education will be more easily achieved. We categories the apps to discussed in this article by; (i) online mind maps; (ii) animated 2D; (iii) animated 3D and (iv) online multimedia.

Online Mind Map Apps is used to supports brainstorming activities (Abd Karim *et al.,* 2020a). The apps help educator to visualize ideas, flowchart, or to set chart in gear in presentable way. The features of online mind map, supports from simple brainstorming to complex tree-block-idea visualization and a good mind map has to laid down all the common features – diagraming tools, unlimited canvases features, comes with the ability to upload files, mind mapping program has an ability to give feedback, comment, suggestion and should be revisit, and amend (Bhattacharya & Mohalik, 2020; Abd Karim *et al.*, 2020b). The online mind map apps such as *Coogle, Bullb MindMeister, Popplet, Freemind* and many more.

Using *Animated Apps* to improve student engagement. Animation supports educator to deliver the hard and complex lesson likes science, mathematics, finance, even language subject in visually appealing manners with fun elements (Nasri, 2020; Rahimi *et al.,* 2021). Learner may interact with animated video that can be pause, rewound, jumped and played to improve understanding and to cope up with lesson complexities. Two type of animated application offers include 2D and 3D animated platform. The online 2D apps such as *Powtoon, Opentoons, Pencil2D, Blender 2D Animated* and many more offered openly that can be utilized by the educator (Ishak & Mushim, 2019; Neta *et al.,* 2020).

While, for *Animated 3D Apps* such as *Bitable, Plotagon, Blender,* and *3ds. Max,* can be used to meet several benefits overcome barrier of age (Martzoukou, 2020; Anders, 2019; Abu Alatta & Momani, 2021), improve communication and delivering lesson (Haspari & Hanif, 2019), bring up understanding to the next level (Ismail *et al.,* 2017), animated character help to improve motivation Saputri *et al* (2018), and build good character as learner love to emulate character as animation have positive impact on cultivating their social skills (Suki & Suki, 2017).
For enhancing the quality of presentation, the use of *Multimedia Apps such as Prezi, Canva, iPresent, AmCharts, Pictochart, or EWC Presenter* were suggested for teaching and learning activities (Zakaria & Khalid, 2016). The apps with cloud-based-tools supported the online presentation for academic purposes via multimedia apps makes presentation skills become better and more sophisticated (Rosmiati & Siregar, 2021; Rubaai & Hashim, 2021).

Use of Social Connecting Platform

Using *social connecting platform* in education is reality. In this context, we consider connecting application such as *WhatsApp, Telegram, Messenger,* and *Discord* as social-connecting-platform. Educator have benefited this social connecting platform in order to communicate and inform their students about many educational activities (Mistar & Embi, 2016; Xin *et al.,* 2021). Task can be delivered through such messaging apps. Thus, these apps provide the social atmosphere that support teaching and learning activities are the most advance connecting platform. Its' allows the real time communication on solving problem and doubt of students without need to meet the lecturer face-to-face or wait for answer via phone (Aying *et al.,* 2019). It is important to recognized this platform by educator to enhance the dissemination of the quality education without worry on geographical and distance issues (Iksan & Saufian, 2017).

Using social media now a days for educational purposes has changed the paradigm of educators and learners. With establishment the open-to-public and private group in social media and other educational system makes education convenient. The tools give educators, students and institution multiple opportunities in improving the teaching and learning methods.

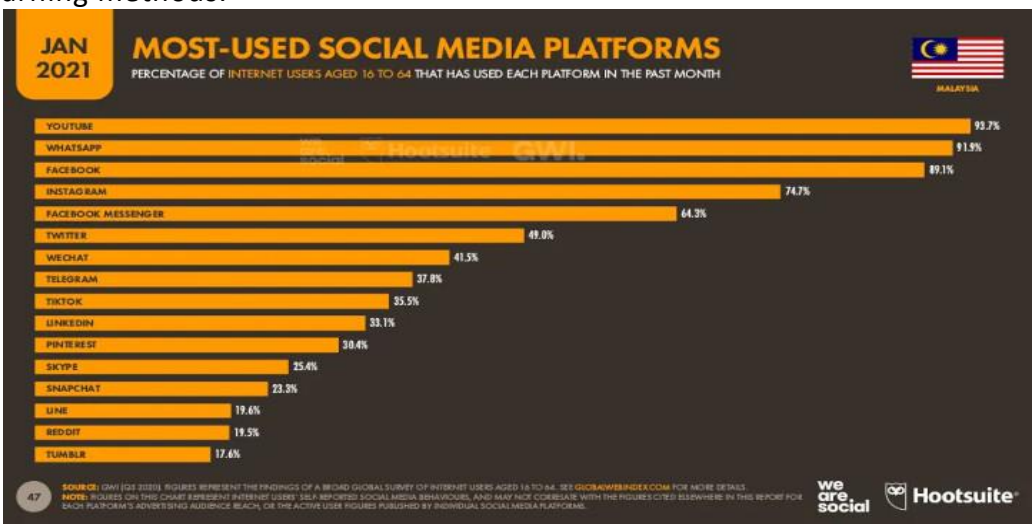

Figure 1 *Statistic of most used social media platform by Malaysian (Source: Kemps, 2021)*

As per illustrated in Figure 1, the graph has ranked with percentage of the most-used social media by the internet user in Malaysia with the range of age by 16 to 64 years old. The statistic revealed that the user on internet were in favor of Youtube, WhatApps, Facebook, Instagram and followed by the others. This was established our understanding that the social platform may also being used for sharing information especially in academic virtual environment. We categorized it as (i) *picture & video-focused platform* such as Facebook, IG, Twitter, Tik-tok and Instagram Tv Yunus & Salehi (2012); Hamdan *et al (*2015) and (ii) *Video & upload platform such as* Youtube, and School Tube (Shariff *et al.,* 2018; Block, 2009).

It is reported by The Guardian on reading among the children in America in as per Figure 2 in declining trend. The traditional reading style in gaining information through reading books, magazine or other hardcopy reading material become an old concept as they looking towards gaining information on the internet (The Voyager, 2018). Thus, the approach via *educational website or blog* as an element of this study in helping educator to utilized such technology to ensure the reading activities can be rejuvenated and align with today technology advancement. Educational website or blog such as *Wordpress, Edublogs, Weebly, Tagged,* or *Reddit* can be suggested to the educator in nurturing reading activities to the learner as it may diversify the educational approach-based technology (Khalid, 2014; Baharuddin & Mohamad, 2020).

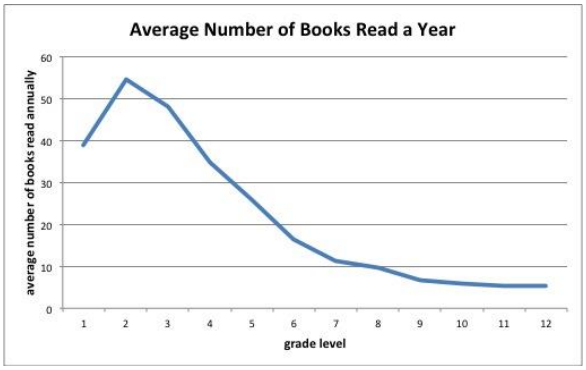

Figure 2 *Declining trend in reading*
(Source: The Voyager, 2018)

There are many *audio-focused platform* offered today. The approach on new audio frenzy streamline with the gadget and new hardware such as Podcast, earbud, echoes, and google home have paved the way. Nigri (2020) considered this the third wave of audio-focused dissemination of info and sound entertainment. The first wave was radio, followed with podcast for the second wave that '*brutally interrupted*' with the social media, and now the audio-focused social network platform – the third wave that equip with the new audio technologies. The audio-focused platform such as *Audlist, HearMeOut, Listen* and *Riffr.* The use of audio-focused social media is seen to be able to be highlighted by educators in recording conversations for various delivery processes. This diverse approach aims to ensure that educators in the country take advantage of the latest technology in line with the development of the 4th Industrial Revolution.

Online Teaching & Learning Technique

Covid-19 pandemic has transformed teaching and learning process. The implementation of curriculum into online format impacted of these learning opportunities involving the interaction between educator and learner. Unfortunately, the long-term consequences yet to recognized. Changes in teaching and learning technique is likely to impact the pedagogy effecting both educator and learner. This requires the systematic changes-based technology continuous effort to ensure well technology-based educator are prepared with educational technology advancement. Several traditional techniques were proposed were adapted into technology were selected in this study. It includes the *online discussion* Hamzah et al (2021); Abuhassna & Amin (2014); *online demonstration* Borton *et al (*2017); *online simulation* Gibbons *et al (*2021)*;* and *online roleplay* (Warland & Smith, 2012; Rahman & Angraeni, 2020). These techniques were to be considered as the element in designing the MOOC.

Methodology

This study adapts the quantitative methodology and the data were gathered through nominal group technique of 13 expert in field of educational technology. The Nominal Group Technique devised by O'neil & Jackson (1983) had been used to structuring a curriculum by experts. The objective of this technique is the exploration of the ideas, elements and related factors on designing and developing MOOC elements from a team of experts to make decision as used in research in Malaysian educational research (Hussin et al., 2018). There are similarities of approach between the Delphi method and NGT in data collection, but NGT emphasizes the view team of experts on the themes, elements or factors in deriving specific item that important to the study (O'neil & Jackson, 1983). This NGT approach will increase the opportunity for each selected expert to ensure that his or her views are a key part of the frame of reference.

The survey was design based on previous study of determination online learning environment based connectivism theory in Massive Open Online Courses (MOOC) and respective traditional element that suit in online learning. This study presenting eighteen (18) elements under three main themes namely Strategies, Methods and Techniques as per illustrated in Table 1. The expert view in determined the impactful elements to be the design elements of the MOOC were measured using the Relative Important Index (RII). The RII was computed using the formula as below:

$$Relative\ Important\ Index\ (RII) = \frac{\sum_{i=1}^{n}(w_i x_i)}{\sum_{i=1}^{n}(x_i)}$$

Where, i – response category index
n – number of experts
w_i – the weight assigned to the i^{th} expert and
x_i – frequency of the i^{th} of expert

Table 2 illustrated the weighted index used to determine the impact of each design element and it's probability of impactful in teaching and learning process. The weighted index of RII responses to each element and measure the impact level and its probability of impactful elements, which used to design the online learning environment (EL-Ariss et al., 2021). The suggested impact level and it's probability as shown in Table 2.

Table 2
Weighted index in determine impacted element

Weighted Index	Impact	Probability of Impactful (P_rI)
> 0.200	Low	No Impact
0.200 – 0.399	Slight-Low	Low Impact
0.400 – 0.599	Moderate	Moderate Impact
0.600 – 0.799	Slight-High	Slight-High Impact
0.800 – 1.000	High	Highly Impact

Validity and Reliability

Prior the instrument was administered; the validity and the reliability test has been conducted. Two experts in educational technology were validating the instrument with several amendment has be done. Then we conducted the reliability test using the application of SPSS version 21.0 to get the Cronbach Alpha value. The coefficient of reliability is ranged $0 \geq x \geq 1$. The closer the value to 1, the greater internal consistency of the element in the scale. The alpha coefficient is 0.847 bring the meaning that the element of the instrument having the high internal consistency; with the reliability value of the items were above the suggested which is more than 0.70 (Muhammad *et al.,* 2021; Ariffin *et al.,* 2021).

Findings

This section is to present the expert opinion in determining the best elements of MOOC design. In determine the final elements. As per illustrated in Table 3, it can be seen that, expert have emphasis that as a reason for first two element need to be implemented as it weighted more than 0.600 suggest that element of *mix centered – teacher core* and *open resources centered* with both at weight index of (RII=0.877, Rank=1) were indicated highly impacted on teaching and learning process. Then, followed by *element mixed centered – student core* (RII=8.00, Rank=3). Meanwhile, the element of *students centered* was slight-high (RII=0.708, Rank=4); and the element of *teacher centered* was weighted moderate as the value (RII=0.615, Rank=5).

Table 3
RII of educator strategies in online teaching and learning

Element	Expert View ≥ 4	3	≤ 2	RII	Ranking	Impact	P_rI*
Teacher centered	6	4	3	0.615	5	Moderate	Moderate Impact
Mixed Centered - Teacher Core	13	-	-	0.877	1	High	Highly Impact
Open Resources Centered	13	-	-	0.877	1	High	Highly Impact
Mixed Centered - Student Core	11	2	-	0.800	3	Moderate	Moderate Impact
Student Centered	3	2	8	0.708	4	Slight-High	Slight-High Impact

** P_rI = Probability of Impactful*

Table 4 shown the experts opinion in determining the use of application in teaching and learning method as the design in MOOC were ranked by using *mind map application* (RII

= 0.969, Rank-1); using *animated 2D* (RII = 0.851, Rank-2); followed by using *animated 3D* (RII = 0.796, Rank-3); and using *online multimedia* (RII = 0.692, Rank-4).

As per illustrated in Table 4, it can be seen that, expert have emphasis that as a reason for first two element need to be implemented as it weighted more than 0.600 suggested that element of using mind map, animated 2D, and 3D at weight index of highly impacted. Meanwhile, the element of online multimedia was weighted moderate impact as the value were 0.692.

Table 4
RII use of application in teaching and learning method

Element	Expert View			RII	Ranking	Impact	P_rI*
	≥ 4	3	≤ 2				
Mind map apps	13	-	-	0.969	1	High	Highly Impact
Animated 2D apps	9	4	-	0.851	2	High	Highly Impact
Animated 3D apps	11	2	-	0.796	3	Slight-High	Slight-High Impact
Online multimedia	6	7	-	0.692	4	Moderate	Moderate Impact

** P_rI = Probability of Impactful*

Table 5 shown the experts opinion in determining the use of social connecting platform in teaching and learning method as the design in MOOC were ranked by using *connecting platform* (RII = 0.923, Rank-1); using *social website and blog* (RII = 0.846, Rank-2); using *picture and video focused apps* (RII = 0.851, Rank-3); aline with using *video upload platform* (RII = 0.811, Rank-3); and using *audio focused apps* (RII = 0.692, Rank-4).

From the Table 5, it can be seen that, expert have emphasis that as a reason for first four element need to be implemented as it weighted more than 0.600 suggested that element of using application that support teaching and learning method via *connecting platform; social website and blog; picture and video focused; video upload platform* at weight index of very highly impacted. Meanwhile, the element of *audio focused platform* was weighted at moderate impact as the value were 0.692.

Table 5
RII use of social connecting platform in teaching and learning method

Element	Expert View ≥ 4	3	≤ 2	RII	Ranking	Impact	P_rI*
Connecting platform	13	-	-	0.923	1	High	Highly Impact
Picture & video focused	11	2	-	0.815	3	High	Highly Impact
Video upload platform	9	4	-	0.815	3	High	Highly Impact
Social website or blog	6	7	-	0.846	2	High	Highly Impact
Audio focused	8	1	4	0.692	4	Moderate	Moderate Impact

*** P_rI = Probability of Impactful*

Table 6 shown the experts opinion in determining the educator technique in teaching and learning as the design in MOOC were ranked by using the technique of *online discussion* (RII = 0.877, Rank-1); aligned with using *online demonstration* (RII = 0.877, Rank-1); using *online simulation* (RII = 0.738, Rank-3); aligned with using *video upload platform* (RII = 0.811, Rank-3); and use of *online role pray* (RII = 0.586, Rank-4).

From the Table 6, it can be seen that, expert have emphasis that as a reason for first four element need to be implemented as it weighted more than 0.600 suggested that element of educator technique that suite to MOOC design where the first two elements – *online discussion and demonstration* at weighted index very highly impacted. Followed by *online simulation* with high impact and the element of *online roleplay* was weighted at moderate impact as the value were 0.586.

Table 6
RII of educator techniques in online teaching and learning

Element	Expert View ≥ 4	3	≤ 2	RII	Ranking	Impact	P_rI*
Online Discussion	13	-	-	0.877	1	High	Highly Impact
Online Demonstration	12	1	-	0.877	1	High	Highly Impact
Online Simulation	10	2	1	0.738	3	Slight-High	Slight-High Impact
Online Roleplay	7	1	5	0.586	4	Moderate	Moderate Impact

* P_rI = Probability of Impactful*

Discussion & Conclusion

This study helps the researcher to identify the elements in designing the online learning environment via massive open online courses. The analysis showed that the nominal group technique that gather the expert in the field educational technology came with the agreement selected on the ranking of the elements. Analysis on the data gathered showed the high weighted, ranking, impact and probability of impactful were assessed.

Scrutinizing the result, several elements in all theme such as in first theme – educational strategies of teacher and student centered; sub second theme – method of use online multimedia and use of audio-focused platform; and third theme – online roleplay seems to be moderate if the element is selected as a design of the learning strategy.

Moderate impact on teacher centered. It is identified in the result that moderate impact on teacher centered if this strategy to be implemented in development phase of MOOC. Previous studied had discussed about the disadvantages of teacher approach that limits several teachings and learning activities. Such disadvantages were listed that this strategy will be monopolized by the educator and limit the learning engagement that encompasses a traditional teaching style with top-down approach (Mora et al., 2018; Gampell et al., 2017), not supporting on developing the skill of higher cognitive and metacognitive Cheung & Jang (2020); Zairon et al (2021), and lead to the specified of lesson content due to prepared solely by the educator (Amran et al., 2021; Salleh & Karim, 2019). Unfortunately, in several cases of learning anxiety; such as understand, conceptual, and reading Dong et al (2019); Mpho (2018) and not IT savvy learner and educator (Baran *et al.,* 2011; Murphy *et al.,* 2019), teacher centered still relevance as effective technique in the issue of the meeting the teaching and learning goals and objectives Darsih (2018); Dole et al (2016), the issue of students' maturity to understand the basic knowledge or lesson Zaid et al (2021) still being the critical issue to the educator.

Moderate impact on the use of online multimedia. Of the moderate impact on the use of online multimedia with relative ranked index of 0.692. The moderate result reflecting on common issues of using online multimedia among the educator. Result is in line with past study on the issue of lack of computer skills and use of technology by educator (Willis, 2020). They also lack of confidence, experience and competent in using the technology Widyaningsih et al (2020) but Winter et al (2021) suggests to make use on collaborative and corporative existing skills and knowledge staff through mentoring and in-school teams.

Moderate impact on audio-focused platform with the RII of 0.692, the result shown that experts in nominal group technique weighted the audio-focused social media in teaching and learning activities were not highly impacted. Several issues had highlighted by past study on easy to lose focus by learner when listening audio Sheng (2020), not all students manage to listen due to internet connection Nurkhamidah (2021) and expensive tools supports audio-focused that not all students and learner can afford to have it (Ha & Ngo 2021). Unfortunately, the study on interactive radio instruction (IRI) support learning activities in remote area, the audio-focused using radio frequency were the stable platform in disseminating the lesson and knowledge (Elliot et al., 20117; Koomar, et al., 2020).

Moderate impact on online roleplay technique. Not all lesson suit to use this technique in teaching and learning session. Thus, result shown of RII of the online roleplay technique was moderate i.e., 0.586. Even though the element having the moderate impact, in some subject, this technique is the best practice to be implemented. For

example, the lesson to promote values in students, law students for court trial, and simulation of board meeting.

In conclusion the computational of relative important index on the decision of experts contributes to the design of the MOOC and the result may lead researcher in developing the virtual educational environment. Specifically, the ranking has made researcher aware the most important up to the less important element in design in term of strategies, method and technique need to be included in the MOOC. As connectivism supports the open resources centered suggests the most effective approach in educational nowadays. Further, the using of apps social connecting platform has been selected as important elements to be included in content material in this MOOC. Also, the expert view on techniques of discussion, demonstration and simulation technique were rank high to ensure the respective learner meet the MOOC development objectives. Result implicated the in producing a design to develop a MOOC in helping educators develop online teaching and learning materials and able to be a reference for further study in the development and evaluation phase.

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