

# Developing an Effective Online Based Training Questionnaire for Higher Education Training Provider

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**Abstract:** Over close to two decades, many organizations have gradually paved ways for employees to undertake more online training as means of obtaining and renewing knowledge deemed necessary to perform their tasks. The recent Covid-19 pandemic has resulted in many employees having to upskill and reskill not only their IT-related abilities but also on how to communicate, work collaboratively and engage in business differently from usual. Because work must continue, employees need to be continuously educated and trained to ensure they can be effective at work. However, not much is known about online-based training determinants that influence training effectiveness. This study therefore attempts to investigate determinants for effective online-based training (OBT) and develop a questionnaire for effective OBT in higher education setting. The study was conducted in three phases: (i) Phase I – Identification of determinants, (ii) Phase II – Development of questionnaire, and (iii) Phase III – Pilot study. Phase I involved literature analysis using thematic analysis to identify determinants, Phase II involved experts (n=3) and Higher Learning Institution (HLI) staff (n=30) to develop the questionnaire, and Phase III involved a pilot study to test the reliability of the questionnaire. The Cronbach's Alpha results showed all proposed determinants are consistent and acceptable except *Personality Traits* and *Attitude* with only 0.515 and 0.295, respectively. Several steps have been put forward as mechanisms to enhance the overall quality and integrity of the OBT questionnaire. The questionnaire is also expected to provide useful feedback on how OBT sessions can be continuously improved in the future.

**Keywords:** online-based training, determinants, effectiveness, higher education

## 1. Introduction

In the era of Industrial Revolution 4.0, most organizations, either business or government entities, have started their digital transformation in managing their organizations. However, with the emergence of the Covid-19 pandemic and other uncertainties, the need for information technology and internet-based communication has intensified and become a trend-by-force to almost all organizations (Chung et al., 2020). In a wider spectrum of job sectors including education, stakeholders must adapt to a new

paradigm of *work from home* (WFH) approach. Hence, these stakeholders are required to step up learning and adapting to the new online based technologies and work style in delivering their tasks effectively and efficiently. Positively, a lot of face-to-face activities organized by many involved parties have been transformed into webinars or online training activities consistent with the current scenario. Unfortunately, the impact of, as well as factors contributing to effectiveness of these programs is indeterminate since there are many personal and external factors, e.g., isolation due to work from home, lack of communication, individual motivation, insufficient equipment and technology platform, lack of supervision, and organization support that could influence training, hence the learning processes. The individual and organization readiness may take a longer time and incur additional costs on training materials, infrastructure, and manpower in adapting to this type of training. Although the online training method has been adopted since the advancement of the Internet, past studies were focused on controlled environment contexts. Thus, this research attempts to identify determinants for online based training effectiveness and produce an assessment framework for online based training (OBT) including for WFH conditions.

## 2. Literature Review

In the present, organizations must be dynamic and agile in facing global challenges and competitiveness. (Garrison, 2021). Human capital investment in the forms of skill and knowledge acquisition through formal education or structured upskilling programs, and competencies and expertise development through training on the job, have become a requisite for all organizations. Institutionalization of training as part of a strategic approach is also deemed crucial for organizations to gain a competitive edge against competitors. Continuously planned and implemented training sessions have been said to increase employee competency and expertise, and directly contribute to organization productivity (Alias et al., 2019; Garrison, 2021). Nonetheless, successful outcomes of learning and training processes are dependent on a host of factors such as, but not limited to, trainee characteristics, training content and method, and trainer competency. On top of these factors, in the current Covid-19 pandemic and endemic scenarios, most organizations have changed their training implementation approaches by adapting and incorporating information technology or online based approach as the main medium for these processes; thus, making technology literacy and readiness as possible elements influencing training success (Susilo, 2020).

Nonetheless, the ecosystem of online training may give disadvantages involving supervision, communication and working environment which in turn leads to ineffectiveness during the training process (Susilo, 2020; Dalgaly, 2020). Susilo (2020) found that in the context of WFH situation, factors such as isolation and low-level interaction between trainees and the trainer are bound to influence the trainees' motivation and satisfaction. Supportive working environment is needed for successful achievement of training objectives. There have been numerous studies examining the many angles of training and from varying perspectives that concentrate on trainees' reactions such as trainee self-efficacy (Panigrahi et al., 2021), trainer-trainee-training content (Alias et al., 2019; Moore et al., 2020), and trainee-barriers-behaviour (Martins et al., 2019). These reaction factors, which are based on the trainees' retrospective feedback as they went through a particular program or course, can and have been used as indicators of training achievement.

Reports on evaluation of training are plentiful and while there are now many training evaluation models, most studies tend to fall back on Kirkpatrick's (1959) as basis for appraisals. Kirkpatrick's Model is a practical framework to assess training outcomes consisting of these elements (1) Reaction, (2) Learning (3) Behaviour and (4) Results. Kaufman and Keller (1994) responded to this model by introducing another level, to ensure a more thorough treatment of evaluation. The Kaufman Model of Learning's five levels of Evaluation are (1) Input and Process, (2) Acquisition (3) Application (4) Organisational payoffs and (5) Societal Outcomes. This model explored different assessment types, contexts, or settings, and even methods but their emphasis on delivery – particularly on variables affecting learning and transfer, adapted from Kirkpatrick's – remains. The various training evaluation models also strive to evaluate the transfer and impact of learning, specifically on how knowledge and skills are applied, and attitude infused, onto their respective jobs and organization performance (Martins et al., 2019). However, in this research, the concentration of the work will focus on the stage of training

exercise only, and not the actual effectiveness at a practical level or application stage of the training received.

It has become crucial for the organization to assess the effectiveness of the conducted training. Training effectiveness could, and should, be reflected in the employees' behaviour, skill, and knowledge within the working environment. For instance, in the context of Universiti Teknologi MARA (UiTM), the Institute of Leadership and Development (ILD) as its training arm began conducting its training online aggressively since the onset of the Covid-19 situation. However, the early-stage effectiveness of these trainings has not been comprehensively assessed. From the above discussion with regards to training effectiveness, there is a need to investigate training determinants and how they affect training effectiveness.

### 3. Methodology

The research was conducted in three phases using a mixed-method approach to identify determinants for effective OBT and develop a questionnaire for higher education in Malaysia. In Phase I, thematic analysis was done to enable the research to develop a conceptual framework for effective OBT. This framework was then used as the basis to develop an effective OBT questionnaire for HE training in Phase II. Subsequently in Phase III, a pilot survey was then conducted to test the reliability and validity of the questionnaire. The phases, as illustrated in Fig. 1, were implemented to achieve the research objective to identify determinants for effective OBT and produce an assessment framework for online based training (OBT).

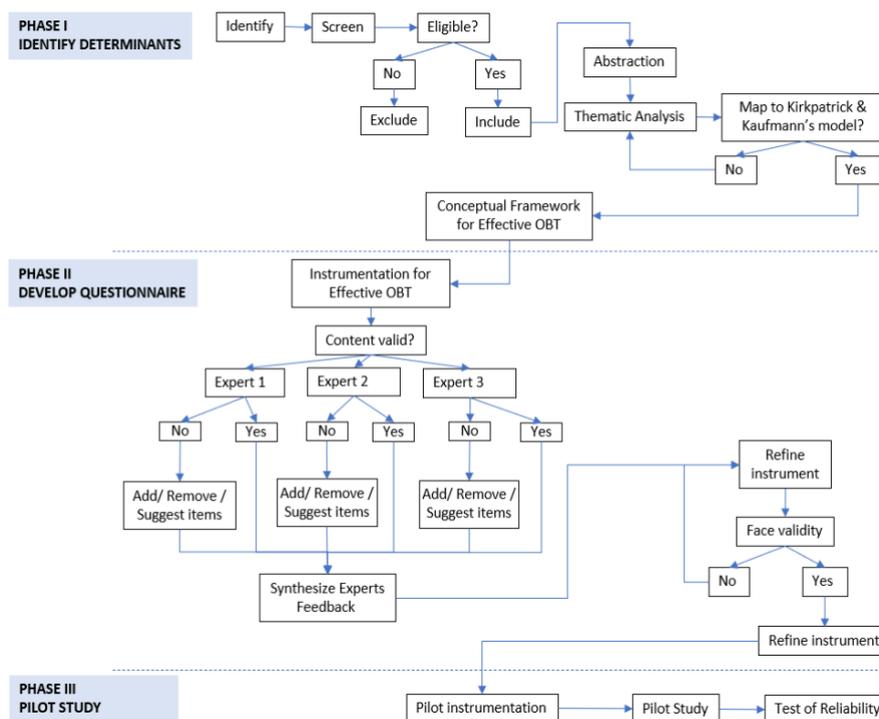


Fig. 1 The Research Phases

#### 3.1 Phase 1: Identification of Determinants

The phase began by retrieving relevant articles using three systematic processes of identification, screening, and eligibility proposed by Shafril et al. (2018). Based on the formulated research questions, three main keywords were used: 'online training', 'determinants', and 'effectiveness'. Synonyms, related terms, and variations were then obtained by using an online thesaurus (thesaurus.com), and experts' opinions. Based on this process, several other keywords were added: 'online learning', 'virtual

training', 'indicator', 'efficacy' and 'efficiency'. These keywords were used as search terms in the Scopus and Web of Science (WoS) databases to identify potential articles to the research questions.

The articles were firstly screened to include only those that are of the past five years, have empirical data, written in English, and which subject area is within education. The authors then manually checked the remaining papers, either by reading the title, abstract or the entire paper, and whether the papers are eligible to answer the research question. Papers that did not focus on online training, determinants, were in the form of a review paper, and were purely science-based such as engineering or environmental science were excluded. The final number of articles concluded to answer the research question was 48. Data abstraction was conducted to all the eligible papers to denote any data that can answer the research questions, and they were placed in a table. Subsequently, the researchers performed thematic analysis and identified themes and sub-themes based on observable patterns and themes, clustering, counting, noting similarities, and relationships that existed within the abstracted data (Braun & Clarke, 2019).

The first step of a thematic analysis was to generate themes. In the process, the authors tried to identify patterns that emerged among the abstracted data. Any similar or related abstracted data were pooled in a group. During theme development, the researchers discussed any inconsistencies, ruminations, variations, or ideas that could be associated with the interpretation of data until a point of agreement on the adjustment of the developed themes and sub-themes. The developed themes and sub-themes were then validated against two most prominent models of training evaluation, namely those of Kirkpatrick (1959), and Kaufman and Keller (1994). The resulting themes and sub-themes have enabled the authors to develop a conceptual framework for effective OBT. The framework was presented to an expert in higher education online based training who then appraised it based on the nine themes and agreed that the themes were appropriate and relevant to the results of the review.

### **3.2 Phase II: Development of Questionnaire**

This phase began with instrumentation for effective OBT, which means a questionnaire was developed. Items were constructed based on the identified themes and sub-themes which represent the determinants and variables of the study, respectively. The questionnaire then went through content validity evaluation by three experts – the first two are a Higher Education (HE) training provider and a statistical expert respectively. The third individual is an expert in HE continuing education, professional studies, training and quantitative survey methods. Each of the three experts was asked to evaluate each item under all determinants and record their agreement. If an expert disagrees with any item, he/she will add, remove or suggest for item improvement. After the process was completed, the researchers synthesized all the experts' feedback, and refined the instrument. The refined questionnaire was then distributed to willing trainees to assess face validity. Items that the respondents found hard to understand were improved and those regarded as acceptable were retained.

### **3.3 Phase III: Pilot Study**

Phase III began with instrumentation for pilot study, in which the validated questionnaire was composed on Survey Monkey, an online survey platform for managing data collection process. A group of pilot respondents (n=30) (lecturers) were selected for the purpose of testing the reliability.

## **4. Result and Discussion**

Reporting of this section mirrors the three research phases deliberated earlier.

### **4.1 Phase 1: The Determinants**

The analysis on the 48 articles extracted from the Systematic Literature Review (SLR) on OBT unearthed a total of eleven categories of determinants, which were further analysed and collapsed into nine themes. Of the nine, the most cited (n=26) effective online training determinant is the *training method*. Training methods here encompass approaches, strategies, and techniques which trainers use,

and participants find effective in improving knowledge, enhancing skills and changing views toward work-related processes and value. Characteristics of OBT which promote hands-on, mind-on learning preferred by the participants include technology-based training employing gamification and game-based training (Shkabarina et al., 2021); contextualized, on-the-job and instructor-led training (Tabor, 2020), collaborative approaches (Liu et al., 2018), and coaching and mentoring approach (Sood et al., 2020). Research participants also reported favourably of OBT that employ two or more student-centred learning (SCL) activities such as forums, exploration, scaffolding and reflection (Xu et al., 2021).

The next determinant seen as crucial for effective online training activities is *training material*. This determinant incorporates two emerging sub-themes, namely resources and tools. Training tools include video editing, content authoring programs like Edmodo and Massive Open and Online Content; social media such as YouTube, Facebook, Skype, or various chatrooms and Learning Management System (LMS) platforms like Moodle and others (Barakhsanova et al., 2021) that help trainers do a better job as trainers. Meanwhile, training resources include reading materials, website reference lists, as well as software or applications needed for the training to run smoothly.

*Training readiness* is also considered an important determinant of effective OBT in twelve of the articles reviewed. Readiness aspects here focus on technical-related readiness of both the participants and the trainer. Analysis of sub-themes suggests that ready-to-be-trained traits that hasten knowledge and skill acquisition online include possessing apposite computer skills, good online learning efficacy, and access to personal computers with internet (Butnaru et al. 2021). Meanwhile, trainers with sound pedagogical readiness are those with teacher flexibility, multidimensionality, and capability to sustain interactive teaching and learning sessions despite minor glitches (Abdul Rahim et al., 2022). Alenezi (2020) and Teng et al. (2021) concur that skills to undertake online training as well as skills of self-control and computer self-efficacy as aspects contributing towards effective training outcome. Having attended a similar OBT is also considered as training readiness given that participants are aware and can anticipate the utility, application and benefit of the training.

Closely related to readiness, the psychological aspects of participants and trainers have also been reported as critical success factors of effective OBT. *Psychological factors* can be broadly defined as elements that internally and externally drive training participants to learn. They include, but are not limited to, motivation, emotion, and self-efficacy (Shkabarina et al., 2021; Moore et al. 2020). Being emotionally intelligent where the participants can each clearly identify their own educational needs, to understand them without the assistance of others and eventually act on achieving the desired training outcomes, are also seen as important in ascertaining training direction (Alenezi, 2020).

Another important determinant of successful OBT linked to psychological factors is attitude. The researchers decided to single out attitude as an independent theme due to the number of specific mentions in the analysis. *Attitude* here refers to positive outlook and approach towards training, which eventually influence behaviour and training outcomes. Participants with a positive attitude reported higher levels of perceived enjoyment, perceived learning, and perceived outcomes of training (Rodríguez-Bonces & Ortiz, 2016). They also look forward to receiving feedback as self-improvement mechanism and tend to be more self-directed (Xu et al., 2021). An OBT run by a trainer with equally good attitude - one who looks forward to and enthusiastic about sharing experiences and new ideas - tends to be more enjoyable and receives higher evaluation score (Butnaru et al., 2021).

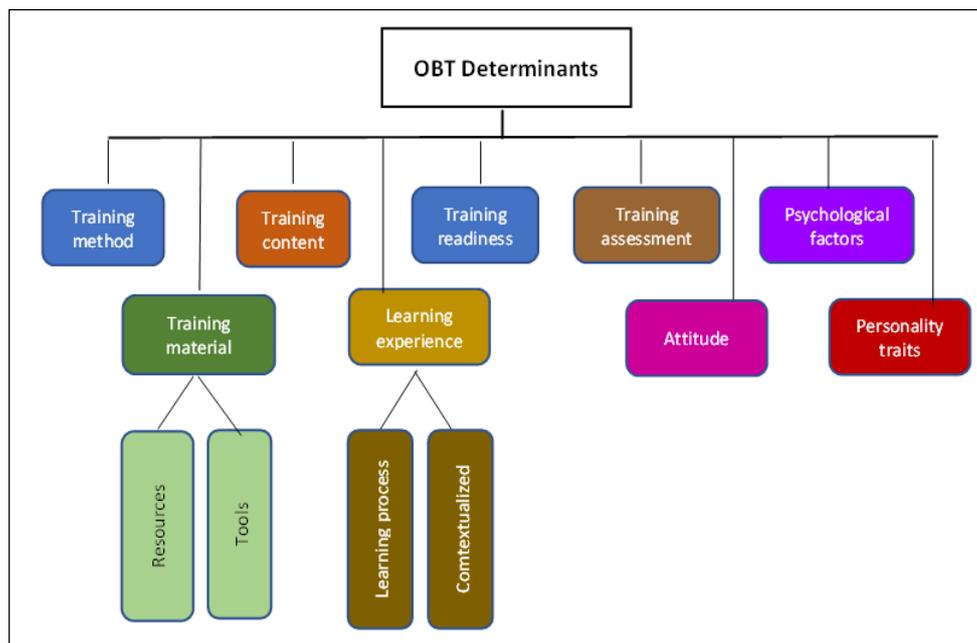
*Personality trait* is a determinant of effective OBT highly linked to attitude described above. Specific characteristic patterns of thoughts, feelings and behaviour that influence participants' attendance in online training fall under this category. Being open and agreeable to training was mentioned many times due to its influence on online learning preparedness and engagement of participants (Moore et al., 2020). So too interaction patterns or activities during training. Hence, for a more comprehensive assessment on how personality traits affect training effectiveness, the researchers considered incorporating dimensions from the Big Five Personality traits which include openness, conscientiousness, extraversion, agreeableness, and neuroticism.

The next two effective OBT determinants which garnered an equal number of mentions are training content and training assessment. *Training content* refers to the specific content of relevance embedded and easily retrievable from the electronic educational resources (Barakhsanova et al., 2021). These also include training materials that provide comprehensive background materials which help with the understanding of more advanced concepts. Al-Adwan et al. (2021) strongly believe that in providing OBT, the quality of training content is key; Moore et al. (2020) emphasize mindfulness approaches in

content preparation and presentation while Xu et al. (2021) advocate the inclusion of teacher feedback for both training content and assessment.

Apart from instructional strategy and learning content, a good curriculum must also have relevant, adaptive assessment. *Training assessment* refers to the nature of tasks that training participants must complete throughout, or by the end of their OBT sessions. These tasks serve to tap into the knowledge, comprehension and analysis, as well as the applications of learning. They could be real-time (Liu et al., 2018), self-assessed (Sood et al., 2020) or a combination of different activities involving worksheet completion, discussions, and achievement tests (Yilmaz et al., 2021).

The final determinant of effective OBT identified is *learning experience*. It refers to the varying personal experiences encountered in the past or during the present OBT sessions which influence future attendance and engagement. Positive learning experiences allow learners to explore self, engage with others, build confidence, etc. while less appealing experiences can result in the learners having to juggle between work hence interfering with the training (Panigrahi et al., 2021). Fig. 2 displays the themes and sub-themes derived from the analysis:



**Fig. 2** OBT Determinants by Themes and Sub-themes

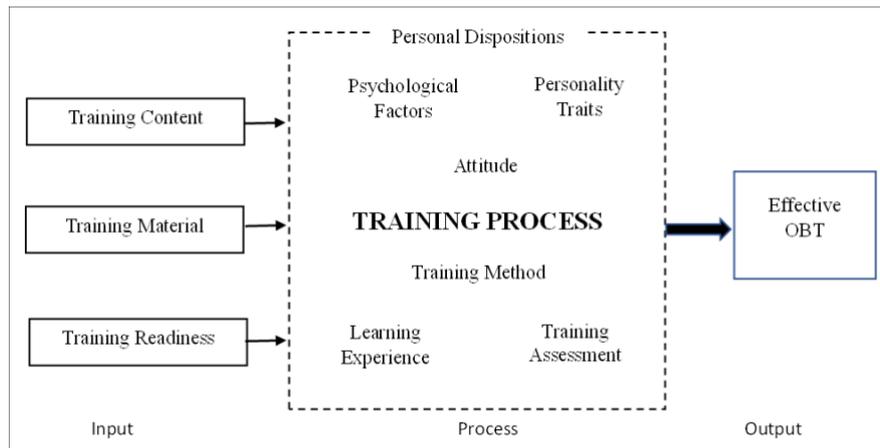
The nine identified determinants of effective OBT were later cross-checked against two prominent models for evaluating training effectiveness, namely the Four-level Approach by Kirkpatrick (1959) and Kaufman’s Model of Learning Evaluation (Kaufman et al., 1995). Theories, frameworks, or models can, and have been, used as tools to decide on the translation of research process into practice, to explain implementation outcomes, and evaluating implementation (Nilsen, 2015). This process is carried out to ascertain if indeed the determinants are relevant, and subsequently can be described or suggested as critical for a successful course or learning journey.

Table 1 displays the mapping of OBT determinants against the models. These determinants only fit up till level two of both the models. This is expected since the main intention of the study is to come up with a mechanism that would allow evaluation of elements contributing towards the early-stage effectiveness of OBT. The premise is that should any of these elements fall short, the training organizer as well as the trainer would be informed of OBT aspects to improve on. While Kirkpatrick’s Four Level Approach is relevant, it is, however, insufficient in providing detailed feedback on early-stage training effectiveness. Thus, this study is mainly based on Kaufman’s Five Levels of Evaluation, as it allows for a more thorough scrutiny of each aspect of the training.

**Table 1.** Mapping of OBT Determinants to Kirkpatrick and Kaufman Evaluation Models

The Four-level Approach: Kirkpatrick (1959)	Kaufman’s Model of Learning Evaluation (1994)	Identified OBT Determinants
<p><b>Level 1: Reaction</b> Feelings and reactions to training; including satisfaction with training content and approach</p>	<p><b>Level 1a: Input</b> Covers elements used to support the training or coaching</p> <p><b>Level 1b: Process</b> Measures process acceptability and efficiency. The actual delivery of the learning experience</p>	<p>Training material Training content Training readiness (technical)</p> <p>Training Methods <b>Psychological factors</b> <b>Personality traits</b> <b>Attitude</b></p>
<p><b>Level 2: Learning</b> Evaluates change in knowledge, skills and attitude of participant</p>	<p><b>Level 2: Acquisition</b> Acquisition of learning and whether individual(s) used it on the job.</p>	<p>Learning experience Training assessment</p>
<p><b>Level 3: Behavior</b> Evaluation on how learning is applied.</p>	<p><b>Level 3: Application</b> Evaluates how well participants utilize new learning in on-the-job performance</p>	
<p><b>Level 4: Results</b> Evaluation of the effects from participants’ job performance changes to the organization</p>	<p><b>Level 4: Organisational payoffs</b> Measures payoffs for organization includes improvement appraisals, cost-benefit and/or consequence analysis</p> <p><b>Level 5: Societal Outcomes</b> Focus on ‘mega-level clients’ as a whole.</p>	

Training content, materials and readiness fit the description of “input” pertinent in ensuring good training outcomes. When planning an OBT program, these resources must be relevant, current, developmentally appropriate, and of quality for employees to know and use in addressing present and future challenges. Training is also seen as effective when all parties involved are in a state of preparedness. The openness, approachability and reaction of trainer and learners are largely the function of their inner and innate personal dispositions like personality traits, psychological factors, and attitude. At the “process” level, how learners react to training is very much dependent on the way instruction is delivered, and how responsive the learners are towards the training and trainer. Meanwhile, level two of the evaluation models deals with the acquisition of intended knowledge, skills and/or values. The determinant training assessment specifically taps into that by seeking changes in knowledge or application of new skills while learning experience focuses more on value attainment and positive attitude formation. A framework depicting the process of how all determinants are related is shown in Fig. 3.



**Fig. 3** The OBT Framework

#### 4.2 Phase II: The Questionnaire

A 65-item questionnaire was developed based on the determinants identified in phase 1. The questionnaire consists of two sections; Section A sought the respondents' demographic background while Section B represents the nine OBT determinants. A summary of descriptor for each identified determinant deliberated in 4.1 became the operational definition on which the items were developed. Table 2 displays the nine determinants, their corresponding definition as well as sample items. The questionnaire also went through the validation process indicated earlier in Section 3.2.

**Table 2.** OBT Determinant Descriptor and Sample Items

Determinants	Operational Definition	Sample Items
Training method (8 items)	Approaches, strategies and techniques which trainers use, and participants found effectual in improving knowledge, enhancing skills and changing views toward work-related processes and value.	<ul style="list-style-type: none"> <li>▪ The online training offers practical, hands-on learning.</li> <li>▪ The online training provides elements of coaching that allow me to learn from others.</li> </ul>
Training material (5 items)	Encompass training tools and resources. Training tools include video editing, content authoring, social media and Learning Management System (LMS) platforms. Training resources include reading materials, list of websites and software or applications for smooth-running sessions.	<ul style="list-style-type: none"> <li>▪ Visual aids used in the training presentation were informative and meaningful.</li> <li>▪ Online training materials that come in variety of forms (e.g., audio, visual and in writing) enhance learning.</li> </ul>
Training content (7 items)	Embedded and easily retrievable content from electronic educational resources. Include training materials that provide comprehensive background which assist understanding of more advanced concepts	<ul style="list-style-type: none"> <li>▪ The training content stimulates me to think in more depth.</li> <li>▪ The training content facilitates better understanding of the topic</li> </ul>

Determinants	Operational Definition	Sample Items
Training assessment (5 items)	Tasks that training participants must complete throughout or by the end of their OBT sessions. Tap into knowledge, skills, comprehension, analysis and applications of learning.	<ul style="list-style-type: none"> <li>▪ The online assessment allowed me to retain much information even after completing the training session.</li> <li>▪ I find the different ways to ascertain understanding/skills, before and after training useful.</li> </ul>
Psychological factors (8 items)	Elements that internally and externally drive training participants to learn; Include, but not limited to, motivation, emotion, and self-efficacy.	<ul style="list-style-type: none"> <li>▪ I am committed to learn because the online training leads to certification</li> <li>▪ I am drawn to the credentials of the instructor</li> </ul>
Attitude (5 items)	Positive outlook and approach towards training, which eventually influences behavior and outcomes of training.	<ul style="list-style-type: none"> <li>▪ I find the online training challenging.</li> <li>▪ Attending online training is as good as attending training physically (F2F).</li> </ul>
Personality trait (10 items)	Specific patterns of thoughts, feelings and behaviour that influence participants' attendance in online training	<ul style="list-style-type: none"> <li>▪ I like that I can freely express my opinion in the online training.</li> <li>▪ I feel restless throughout the online training session</li> </ul>
Learning experience (8 items)	Varying personal experiences encountered in the past or during the present OBT sessions which influence future attendance and engagement	<ul style="list-style-type: none"> <li>▪ I engaged in a lot of self-reflections during the online training.</li> <li>▪ Similar to past experiences, I find attending this online training tiresome.</li> </ul>
Training readiness (9 items)	Technical-related readiness of participants and trainer. Include possessing skills to undertake online training, skills of self-control and computer self-efficacy.	<ul style="list-style-type: none"> <li>▪ I know how to participate effectively in the online training.</li> <li>▪ I have a dedicated workspace where I can attend training without distraction.</li> </ul>

### 4.3 Phase III: The Pilot Study

All variables in the questionnaire were assigned a level of measurement according to variable suitability and their sections (refer Table 3).

**Table 3.** Description of variables

Variable	Level of Measurement
<i>Demographic Section</i>	
Gender, Highest Education Level, Current Post Internet Access, Personal Computer Access, Computer Condition, Online Training Experience	Nominal
Working experience	Ratio
Income	Ordinal

OBT Determinants Section

Training Content, Training Material, Training Readiness, Personality Trait, Attitude, Psychological Factors, Training Method, Learning Experience and Training Assessment Ordinal

A 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree was applied for all OBT determinant variables. The outcome of a pilot test conducted to assess the instrument's reliability, and improvements made, is as reported in Table 4.

**Table 4.** Reliability Test Using Cronbach's Alpha

Variable	Cronbach's Alpha	
	Original	Improved Value
Training Content	0.627	-
Training Material	0.813	-
Training Readiness	0.768	-
Training Method	0.737	-
Psychological Factor	0.731	-
Attitude	0.295	0.659 After removal of items which lack internal consistency
Personality Trait	0.556	0.664 After removal of item which lack internal consistency
Learning Experience	0.740	-
Training Assessment	0.829	-

The Cronbach Alpha value for all determinants *except* attitude and personality trait are acceptable given that they range between 0.627 to 0.829. For the factors to be considered as reliable and consistent, coefficient alpha must not be less than 0.7, and is more acceptable if score is closer to 1 (Salkind, 2014). However, Ghazali (2008 in Mohamad et al., 2015) did indicate  $\alpha$  of 0.6-0.7 as an acceptable level of reliability. For *Personality Traits* determinant, inter-item correlational analysis focusing on items affecting low Cronbach alpha value was carried out. Inter-item correlation analysis was conducted with the aim to investigate which individual item in the construct of Personality Trait significantly affects the performance of Cronbach alpha-value. High negative correlation between two items reflects the opposite interrelationship between them or a weak consistency between them. Therefore, either one of the items cannot be included in the construct to measure personality traits. This is because the combination of these two items when combined, will confuse the respondent. Thus, to improve the degree of reliability of the construct, one of the items needs to be dropped. In this case, item number 10 is chosen because it has high negative correlation with item 3 (-.395), 5 (-.328) and 9 (-.341) compared to other items (refer to Table 5 below). Since the construct only consists of 10 items and after dropping item 10, the Cronbach-alpha value is improved, there was no need to search for other influential item to be dropped. The exclusion of item number 10 has contributed to improved coefficient alpha from 0.556 to 0.664.

**Table 5.** Inter-item Correlation Matrix for Personality Trait

Inter-item Correlation Matrix										
	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10
Item 1	1.000	.273	.345	.436	.208	.322	-.023	.031	.137	-.069
Item 2	.273	1.000	.296	.459	-.004	.292	-.061	.231	-.129	.173
Item 3	.345	.296	1.000	.696	.324	.501	.228	.034	.091	-.385
Item 4	.436	.459	.696	1.000	.110	.453	.194	.304	.198	-.123
Item 5	.208	-.004	.324	.110	1.000	.354	-.059	.127	.360	-.328
Item 6	.322	.292	.501	.453	.354	1.000	.205	.087	-.026	-.137
Item 7	-.023	-.061	.228	.194	-.059	.205	1.000	.405	-.089	.062
Item 8	.031	.231	.034	.304	.127	.087	.405	1.000	.065	.036
Item 9	.137	-.129	.091	.198	.360	-.026	-.089	.065	1.000	-.341
Item 10	-.069	.173	<b>-.385</b>	-.123	<b>-.328</b>	-.137	.062	.062	<b>-.341</b>	1.000

Meanwhile, in the case of *Attitude*, the Cronbach Alpha value can be improved from 0.295 to 0.659 by excluding items with the weak consistency or high negative correlation between them shown by high negative correlation in the inter-item correlation matrix similar to the previous construct's relevance identification (refer to Table 6). This improvement can be made only by removing either item 3 or item 4 because the two items have the highest negative correlation (-0.364). In this case, item 3 should be removed because item 3 also having negative correlation with item 1 (-.082) and 2 (-.075) while item 4 is retained. Since the number of items in the construct to measure Attitude is very few (i.e. only 5 constructs), instead of removing item 3, another way to improve the Cronbach Alpha value would be to add more items to the construct.

**Table 6.** Inter-item Correlation Matrix for Attitude

Inter-item Correlation Matrix					
	Item 1	Item 2	Item 3	Item 4	Item 5
Item 1	1.000	.479	<b>-.082</b>	.543	-.013
Item 2	.479	1.000	<b>-.075</b>	.125	.035
Item 3	-.082	-.075	1.000	-.364	.041
Item 4	.543	.125	<b>-.364</b>	1.000	.228
Item 5	-.013	.035	.041	.228	1.000

## 5. Discussion

The primary goal of this study was to identify determinants of OBT and to develop an instrument to assess effective OBT in HLI. The research discovered nine OBT determinants that may affect effective OBT in HLI through thematic analysis: training assessment, training material, training

readiness, learning experience, training method, psychological factor, personality trait, attitude, and training content. These determinants were consistent with previous models for evaluating training effectiveness developed by Kirkpatrick (1959) on the reaction and learning level, and Kaufman and Keller (1994) on the input, process, and acquisition level. Based on the determinants, a questionnaire set of 65 questionnaire items was created, addressing all sub-themes and items identified through thematic analysis. The questionnaire was validated by relevant field experts, and the expert validation resulted in improvements to some of the question items. Face validity was then tested on ten willing trainees, and items that they found difficult to understand were improved while those deemed acceptable were retained. A pilot study was conducted to assess the questionnaire's reliability.

The pilot study revealed that the questionnaire is valid and reliable for measuring effective OBT in higher education, which is the study's goal. The questionnaire's Cronbach alpha ranged from 0.63-0.83 for each determinant, which conformed to the reliable range by Salkind (2014) and Ghazali (2008 as in Mohamad et al., 2015), and thus this conclusion was reached. The outcome demonstrates that improving some of the items increased the rigour of the determinants. As a result of the study, it was possible to conclude that item questions on training assessment, training material, training readiness, learning experience, training method, psychological factor, personality trait, attitude, and training content are valid and reliable. The items in the construct are inter-related consistently among each other. The study anticipated the reliability of the constructs for each determinant which consequently reflect the quality of the whole set of the questionnaire to be validly used for data collection. In the case of assessing the effectiveness of OBT, the questionnaire can be used to investigate the significant contribution of the determinants in further research, which could eventually lead to an increase in effective OBT in HLI.

The research findings are consistent with previous studies' recommendations regarding the need to change training implementation approaches by adapting and incorporating information technology or an online-based approach as the primary medium, as well as the requirement for technology literacy and readiness as potential factors influencing training success (Susilo, 2020), and the need to continuously plan and implement training to increase employee competency and expertise (Alias et al., 2019; Garrison, 2021). These will directly contribute to organisational productivity in the dynamic and agile environment of global challenges and competitiveness at present and in the future.

The study has a few limitations. The findings are limited to communities with similar characteristics to the study participants, who were HLI lecturers. Further research with more diverse representatives, including other HLIs, is required to improve the generalizability of the findings. However, the findings are consistent with the study's goal of developing a questionnaire for effective OBT in HLI. The low value on Attitude question items also leaves room for improvement. Despite these limitations, this study benefits HLI training providers by setting the groundwork for future research on measuring, developing, and evaluating effective OBT in the HLI context.

## 6. Conclusion

Through the three phases of the study, the researchers were able to (i) identify nine determinants of effective OBT through critical analysis of SLR, (ii) build a framework for effective OBT, and (iii) develop an instrument to assess the effectiveness of OBT. Of the nine determinants, two had low reliability scores resulting in the authors having to make necessary adjustments. Specifically, the study uncovered weaknesses in the form of poorly developed items for the determinant *Attitude*. Since past studies suggest that learner and trainer attitude do influence training outcomes (Rodríguez-Boncos & Ortiz, 2016; Xu et al., 2021; Butnaru et al., 2021), more items representing attitude can be added so as to improve the overall value for an effective OBT questionnaire, and to confirm whether or not attitude is a reliable determinant of OBT. A repeated validation process and another round of pilot test for reliability confirmation need to be carried out since they are crucial requisites in questionnaire development. By engaging in these processes, the authors hope that the instrument would serve as a reliable feedback mechanism that will help ensure training carried out online by the university is of good quality.

## 7. Co-Author Contribution

The authors affirmed that there is no conflict of interest in this article. Author1 is responsible for the development of OBT instrument and framework; Author2 and Author 3 carried out the statistical analysis and interpretation of results; Author4 wrote the research methodology and oversaw the entire write-up of the article. All four authors worked together on the SLR synthesis and survey distribution.

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## 9. References

- Abdul Rahim, N.N., Humaidi, N., Aziz, S.R.A & Zain, N.H.M. (2022). Moderating Effect of Technology Readiness Towards Open and Distance Learning (ODL) Technology Acceptance During COVID-19 Pandemic. *Asian Journal of University Education*, [S.l.18 (2), 406-421,
- Al-Adwan, A.S., Albelbisi, N.A., Hujran, O., Al-Rahmi, W.M., & Alkhalifah, A. (2021). Developing a Holistic Success Model for Sustainable E-Learning: A Structural Equation Modeling Approach. *Sustainability*. 13(16), 9453. <https://doi.org/10.3390/su13169453>
- Alenezi, A.M. (2020) The relationship of students' emotional intelligence and the level of their readiness for online education: A contextual study on the example of university training in Saudi Arabia. *The Education and Science Journal*. 4(22), 89–109.
- Alias, S. A., Ong, M. H. A., Rahim, A. R. A., & Hassan, R. (2019). The Role of Training Design Factors in Influencing Training Effectiveness among Public Service Employees. *International Journal of Academic Research in Business and Social Sciences*, 9(5), 898 – 913.
- Ashley M. Hughes, Stephanie Zajac, Amanda L. Woods, Eduardo Salas (2019). The Role of Work Environment in Training Sustainment: A Meta-Analysis. *Human Factors: The Journal of the Human Factors and Ergonomics Society*. 62(1), 166-183.
- Butnaru, G.I., Niță, V., Anichiti, A. & Brînză, G. (2021). Effectiveness of Online Education during Covid 19 Pandemic—A Comparative Analysis between the Perceptions of Academic Students and High School Students from Romania. *Sustainability* 13, 5311. <https://doi.org/10.3390/su13095311>
- Braun, V. & Clarke, V. (2019) Reflecting on reflexive thematic analysis. *Qualitative Research Sport Exercise Health*. 11(4), 589–597.
- Chung, E., Subramaniam, G., Christ Dass, L. (2020). Online Learning Readiness Among University Students in Malaysia Amidst Covid-19. *Asian Journal of University Education*, 16(2), 45-58.
- Dalgaly, T. (2020) Benefits and Drawbacks of Online Education. A paper presented at SLET-2020: *International Scientific Conference on Innovative Approaches to the Application of Digital Technologies in Education*, November 12-13, 2020, Stavropol, Russia retrieved from [http://ceur-wws.org/Vol-2861/paper\\_25.pdf](http://ceur-wws.org/Vol-2861/paper_25.pdf)
- Garrison, J. (2021) Building a Learning and Development Strategy for an Agile Organization. A whitepaper retrieved from <https://www.cprime.com/wp-content/uploads/2021/05/Building-a-Learning-and-Development-Strategy-for-an-Agile-Organization-Whitepaper-2.pdf>
- Kaufman, R. & Keller, J. (1994). Levels of Information: Beyond Kirkpatrick. *Human Resource Development Quarterly*. 5(4). 371-380.
- Kirkpatrick, D. (1959). Techniques for evaluating training programs. *Journal of the American Society for Training and Development*, 13 (11), 3-9.
- Liu, L., Li, J., Yuan, S., Wang, T., Chu, F., Lu, X., Hu, J., Wang, C., Yan, B & Wang, L. (2018). Evaluating the effectiveness of a preclinical practice of tooth preparation using digital training system: A randomised controlled trial. *European Journal of Dental Education*. 2018; 20, 1–8. <https://doi.org/10.1111/eje.12378>

- Martins, L. B., Zerbini, Thais., and Medina, Francisco J. (2019). Impact of Online Training on Behavioral Transfer and Job Performance in a Large Organization. *Journal of Work and Organizational Psychology*. 35(1), 27-37.
- Mohamad, M. M., Sulaiman, N. L., Sern, L. C. and Salleh, K. M. (2015). Measuring the Validity and Reliability of Research Instruments. *Procedia - Social and Behavioral Sciences*. 204, 164 – 171.
- Moore, S., Barbour, R., Ngo, H., Sinclair, C., Chambers, R., Auret, K., Hased, C. & Playford, D (2020). Determining the feasibility and effectiveness of brief online mindfulness training for rural medical students: a pilot study. *BMC Medical Education*. 20, 104 (2020). <https://doi.org/10.1186/s12909-020-02015-6>
- Nilsen, P. (2015) Making sense of implementation theories, models and frameworks. *Implementation Sci* 10, 53.
- Panigrahi, R., Srivastava, P.R. & Panigrahi, P.K. (2021) Effectiveness of e-learning: the mediating role of student engagement on perceived learning effectiveness, *Information Technology & People*, 34(7), 1840-1862.
- Rodríguez-Bonces, M. & Ortiz, K. (2016) Using the Cognitive Apprenticeship Model with a Chat Tool to Enhance Online Collaborative Learning. *Gist Education and Learning Research Journal*. 13, 166-185.
- Salkind, N. J. (2014). *Statistics for people who (think they) hate statistics*. 5 edition. Los Angeles: SAGE
- Shaffril, H.A.M, Krauss, S. & Samsuddin, S.F. (2018). A systematic review on Asian's farmers' adaptation practices towards climate change. *Science of The Total Environment*. 644:683-695.
- Shkabarina, M., Vitiuk, V., Surzhuk, T., Iovkhimchuk, N. & Klochko, T. (2021) The effectiveness of the implementation of interactive methods in the distance learning system of future primary school teachers. *Laplage em Revista*, 7, 332-342.
- Sood, A., Qualls, C., Tigges, B., Wilson, B. & Helitzer, D. (2020) Effectiveness of a Faculty Mentor Development Program for Scholarship at an Academic Health Center. *Journal of Continuing Education in the Health Professions*, 40(1), 58–65.
- Susilo, D. (2020). Revealing the Effect of Work-From-Home on Job Performance during the Covid-19 Crisis: Empirical Evidence from Indonesia. *The Journal of Contemporary Issues in Business and Government*. 26 (1), 23 – 40.
- Tabor, J.W. (2021). Chaos: exploring an engaging online model for rapid application during the pandemic. *Educational Technology Research and Development*. 69, 97–100.
- Teng, L., Tan, Q. & Ehsan, A. (2021). Assessing the impact of cultural characteristics, economic situations, skills and knowledge on the development and success of cloud-based e-learning systems in the COVID-19 era. *Kybernetes*. Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/K-12-2020-0838>
- Wang, Y., Ma, J., Kremer, G.E. & Jackson, C.L. (2018) An investigation of effectiveness differences between in-class and online learning: an engineering drawing case study. *International Journal on Interactive Design and Manufacturing*. 13(2). <https://doi.org/10.1007/s12008-018-0510-8>
- Xu, Q., Chen, S., Wang, J. & Suhadolc, S. (2021) Characteristics and Effectiveness of Teacher Feedback on Online Business English Oral Presentations. *Asia-Pacific Education Researcher*. 30(6). 631-64.
- Yilmaz, Y., Sarikaya, O., Senol, Y., Baykan, Z., Karaca, O., Yilmaz, N.D., Altintas, L, Onan, A. & Sayek, I. (2021). RE-AIMing COVID-19 online learning for medical students: a massive open online course evaluation. *BMC Medical Education* 21, 303. (2021). <https://doi.org/10.1186/s12909-021-02751-3>.