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Validation of a preliminary competency assessment scale for Malaysian graphic design graduates

ABSTRACT

The criteria for measuring the competency levels of graphic design (GD) graduates have continuously been shaped by the changing context of practice. However, previous studies provide little evidence on the existence of an effective competency assessment scale for GD graduates. The purpose of the study is to evaluate the psychometric properties of a preliminary competency assessment scale for GD graduates in Malaysia. 207 final year GD degree students in Malaysia were sampled to validate the scale. The data was analysed using exploratory factor analysis and Cronbach's reliability test. The results suggested that the preliminary scale consists of 12 constructs and 59 items under five competency dimensions. All 12 constructs yielded high internal consistency values, ranging between .723 and .914. Theoretically, the validated scale contributed to a new body of knowledge to the competency assessment of GD graduates in Malaysia. Practically, the findings provided relevant stakeholders with prescribed standards of performance and appropriate tools to assess the competency levels of new entrants to the GD profession.

KEY WORDS

Competency assessment scale, graphic design graduates, exploratory factor analysis, validity and reliability, Malaysia

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Introduction

There is no argument that the context for the practice of graphic design (GD) today has changed internationally. Emerging trends such as digital transformation, increasing complexity of design problems, dynamic shifts of the global economy, and divergence in people's preferences and behaviours have significantly expanded the job scope and possible career pathways of the practitioners (The American Institute of Graphic Arts [AIGA], 2015, 2021). No longer just work as craftsmen or decorators, contemporary graphic designers are accountable for creating viable, ethical, and effective design solutions by actively engaging themselves in interdisciplinary teams. Designers with relevant competencies to deal with these new patterns of practice are in demand in the global employment market (Dziobczenski, Person & Meriläinen, 2018; Google et al., 2017; AIGA et al., 2019).

As such, the education of graphic designers has been called to go beyond the conventional scope of technical training to produce well-qualified graduates who can meet the evolving expectations of industry practice (Davis, 2017; Heller, 2015). A number of attempts have been carried out in different countries, such as India (Ramneek, 2017; Taneja, 2021), United Kingdom (Dziobczenski & Person, 2017), Brazil (Dziobczenski et al., 2018), Ghana (Adu, 2015; Opoku, Appiah & deGraft-Yankson, 2020), Finland (Dziobczenski et al., 2018), United States (Bridges, 2016; D'Amico, 2018;

Google et al., 2017; AIGA et al. 2019), and Hong Kong (Cheung, 2016) to identify the knowledge, abilities, skills, and qualities required by new entrants to the GD profession. In general, these studies implied that GD graduates are expected to demonstrate a clear evidence of additional knowledge and skills, such as business and marketing awareness, creative thinking, communication, teamwork, project management, problem-solving, strategic thinking, emotional intelligence, adaptability, and so forth when starting their professional careers.

GD is a popular discipline in Malaysia. According to Ong (2017), the number of design students in Malaysia increased gradually between the year 2000 to 2010, from 8,000 to 10,000 each year, and it is believed that the number will be growing (Ong, 2017). This phenomenon has contributed to the prevalence of GD graduates in the workforce.

However, some scholars have expressed their concerns about the design education system in Malaysia and the 'outcomes' it produces. Debbie (2011) conducted interviews with prominent industry professionals found out that higher educational institutions (HEIs) "are not producing graduates who are fit for the industry" (p. 140) and that "the design education in many Malaysian institutions is still very much based on 'spoon-fed' system" (p. 149). The competency levels of GD graduates vary between institutions due to the lack of standardisation within the design education system in Malaysia (Debbie, 2011). Lim (2015) mentioned that the curricula of the design-related programmes in Malaysia, including GD, are very 'skill-oriented'. He agreed that most graduates are well-versed in producing good-looking works to meet the demands of the industry. However, they are not trained to respond to the real needs of society and lack of the capability to develop innovative products or strategies to drive economic growth. Since most of the Southeast Asian nations are putting more attention on the design to gain a competitive edge in the region, Lim (2015) suggested that design and entrepreneurial thinking must be included in design curricula in Malaysia to develop graduates' ability to "see business potentials, develop new markets, generate effective business plans, engage in market research, identify competitive advantages of their brands, conduct risk management, and make decisions" (p. 60). Rahman (2013) shared similar views and suggested a new direction of educating future designers in Malaysia. As she highlighted,

> *design should be for the people and the society, to improve the livelihood, encouraging sustainability rather than short-term outcomes. For that, designers need to start thinking creatively and critically. This thinking does not come naturally. It has to be learned and to be practiced for it to become part of the designer's core value (Rahman, 2013:p.30).*

Wong, Idris and Tan's (2020) study surveyed 19 university-level design academics and 13 industry practitioners who specialise in visual communication design, digital and interactive design, and advertising design to identify the competencies required by new entrants to the GD profession in Malaysia. Their findings replicated the findings of previous studies in other countries and supported the views of the scholars as mentioned earlier. Teamwork and leadership, project management skills, marketing fundamentals, self-efficacy, advertising design skills, reflective thinking skills, communication skills, industry knowledge, emotional intelligence, and design fundamentals were ranked by the experts as the top 10 needed competencies by GD graduates in Malaysia. This means that the expectations of GD graduates in Malaysia are similar with the global practice, and therefore the key question here is whether what the Malaysian students learn in the university is what they are expected to perform in the practice.

To assure the quality of design graduates, the Malaysian Qualifications Agency (MQA), an accrediting body of academic programmes HEIs in Malaysia, has developed a set of programme standards to guide the development and implementation of Art and Design related programmes. All design programmes, are required to include the five clusters of learning outcomes (LOs), i.e., knowledge and understanding; cognitive skills; functional work skills with focus on practical skills, interpersonal skills, communication skills, digital skills, numeracy skills, and leadership, autonomy and responsibility; personal and entrepreneurial skills; and, ethics and professionalism, to ensure the graduates obtain the necessary knowledge and skills in design practice (Malaysian Qualifications Agency (MQA), 2017). The specific competencies that the design graduates will need to obtain upon the completion of their studies at bachelor's degree level are:

- Interpret and apply knowledge and skills including the use of numeracy techniques in relevant areas of Art and Design for innovative practices.
- Critically analyse historical, contextual, conceptual theories, and ethical judgment in Art and Design practice.
- Create and conceive ideation and innovation for the practice areas of art and / or design.
- Articulate and communicate ideas and concepts comprehensively in visual, written, and oral engagements.
- Execute design concept and cost analysis through the use of digital and other technologies for effective delivery.
- Construct a portfolio for Art and Design, through reflectivity, review, and evaluations.

- Communicate and interact with experts, peers, clients, superiors and society under work and organisational related environment for the development of art and / or design (Malaysian Qualifications Agency (MQA), 2020:p.15).

The criteria for measuring GD graduates' competencies have continuously been shaped by the rapidly changing technological, economic, cultural, social, and business demands (Higgins, 2008). According to Gonczi, Hager and Athanasou (1993:p.5), competency-based assessment can be described as "the process of determining whether a candidate meets the prescribed standards of performance, i.e. whether they demonstrate professional competence". The development of required competencies is a proactive response to the growing demand for accountability of GD education in recent years (Chiang, Idris & Chuen, 2018; Chiang, Idris & Chuen, 2019). Competency assessment is crucial to determine if the graduates are receiving a quality education with sufficient preparation for their future employment, professional careers in design, and personal lives (Davis, 2017; Dziobczenski et al., 2018). However, it is learned from the literature review that internationally, none of the existing studies (e.g., Ramneek, 2017; Taneja, 2021; Dziobczenski & Person, 2017; Dziobczenski et al., 2018; Adu, 2015; Opoku, Appiah & deGraft-Yankson, 2020; Bridges, 2016; D'Amico, 2018; Cheung, 2016) have gone beyond to develop a psychometrically sound measurement scale to provide a more feasible and holistic competency assessment solution for stakeholders involved in the educational or employability process of GD graduates. Locally, there is no easy and effective way to determine the competency levels of design graduates in Malaysia, specifically in GD related programmes. Although cumulative grade point average (CGPA) has long been using as an overall academic achievement indicator of all university graduates, including GD, there is very little scientific evidence to suggest that it can effectively predict their actual performance while working in the industry. Previous studies (e.g., Debbie, 2011) implied that local employers in GD industry are facing difficulties in recruiting qualified graduates to join their companies.

The challenge of assessing whether the graduates have achieved the expected competency levels cannot be overlooked. Such a challenge is inherent in the diverse and constantly changing nature of design practice. The key concern is on how to effectively measure if they have obtained the desired competencies in a rapidly changing work environment. In addition, the validity and reliability of the measurement tool must need to be carefully examined to ensure its accuracy. Therefore, the researchers of the study intend to tackle this challenge to fill the gap in the literature, specifically in the context of Malaysia.

Purpose of the study and research questions

Wong, Idris and Tan (2021) had conducted a study using modified Delphi technique to gain consensus among a collective of experts in Malaysia. A list of 29 competency constructs and 108 performance indicators under five major competency dimensions (CDs), i.e., cognitive competency dimension (CCD), functional competency dimension (FCD), personal competency dimension (PCD), ethical competency dimension (ECD), and meta-competency dimension (MCD) were identified. In other words, in the local experts' opinions, GD graduates are required to demonstrate the acquisition of these competency constructs and items for superior work performance. The study aims to evaluate the psychometric properties of the preliminary competency assessment scale that was previously developed by Wong, Idris and Tan (2021). Such attempt is essential and crucial because it can possibly minimise the measurement error and strengthen the accuracy of the scale. Accuracy, in this case, means that the assessment results are valid and reliable in measuring of the knowledge, skills, and abilities of university GD graduates. Correspondently, the research question of the study is: what is the validity and reliability evidence of the preliminary scale to measure the competency levels of new entrants to GD profession for each CD in Malaysia?

Methodology

Population and sampling

Final year GD students at the bachelor's degree level were the target population for the survey questionnaire. They were selected using simple random sampling technique. The eligible students must acquire three common characteristics: (1.) they are now in their final year of undergraduate studies; (2.) they are majoring in GD related programmes such as visual communication design, advertising design or digital and interactive design; and (3.) they are studying in either private or public higher educational institutions (HEIs) in Malaysia. The final usable sample size was 207.

Instrumentation

The survey questionnaire consists of five sections. Section One is a short introduction to the study. Section Two is an electronic informed consent form. Section Three comprises demographic questions such as the programme of study, ethnic group, and gender. Section Four is an instruction on how to answer the questionnaire. Section Five comprises a list of 108 items as shown in Table 1. These items were the performance

indicators of the 29 competency constructs developed by Wong, Idris and Tan (2021). The participants were requested to examine and reflect on the items and self-evaluate their competency levels based on a 5-point Likert scale as proposed by Dreyfrus and Dreyfus (1986), where: 1 = Novice; 2 = Advanced Beginner; 3 = Competent; 4 = Proficient; and 5 = Expert.

Prior to the field research, three scholars from the design field were invited to review the questionnaire. They were selected based on their integrated education and work experiences. The reviewers were asked to check whether the items adequately captured the content or not, and to examine the accuracy of the wording used. Besides, the survey questionnaire was distributed electronically to 40 final year GD degree students who studying at private or public HEIs in Malaysia. They are the target population of the study. 29 of them responded and completed the questionnaire.

The responses were calculated using Cronbach's reliability test. All constructs in the survey questionnaire demonstrated acceptable reliability values of .60 and above (Flynn, et al., 1990; Nunnally, 1978). In other words, all items were retained for actual field research.

Data analysis and results of the study

The data collected were analysed following a two-step procedure. First EFA was performed on the items with varimax rotation using Statistical Package for Social Science (SPSS) version 22. Specifically, principal component analysis (PCA) was applied as the factor extraction method. The analysis aims to evaluate the underlying structures of each CD and the appropriateness of the items. It involved an iterative estimation process to

Table 1

Competency constructs and items for GD graduates, developed by Wong, Idris and Tan (2021)

Competency Dimension	Construct		No. of Items
Cognitive Competency Dimension	Design Fundamentals		3
	Industry Knowledge		4
	Contextual Awareness		4
	Multidisciplinary Knowledge		2
	Business Fundamentals		3
	Marketing Fundamentals		3
		Total	**19**
Functional Competency Dimension	Technical Design Skills		3
	Conceptual Design Skills		4
	Interactive Design Skills		3
	Advertising Design Skills		3
	Software Skills		3
	Graphic Print Production Skills		4
	Project Management Skills		5
		Total	**25**
Personal Competency Dimension	Aesthetic and Visual Sensitivity		3
	Self-driven		3
	Adaptability and Flexibility		3
	Emotional Intelligence		4
	Interpersonal Skills		3
	Self-efficacy		3
		Total	**19**
Ethical Competency Dimension	Professional Behaviours		9
	Professional Expertise		5
	Professional Values		3
		Total	**17**
Meta-competency Dimension	Creative Thinking Skills		3
	Problem-solving Skills		3
	Design Thinking Skills		3
	Critical Thinking Skills		4
	Reflective Thinking Skills		4
	Communication Skills		7
	Teamwork and Leadership Skills		4
		Total	**28**

Source: Wong, Idris & Tan (2021)

reach the final solution. Factors with eigenvalue of 1 or greater were retained because they were deemed as valid factors (Field, 2013; Hair et al., 2010). All retained items must achieve loadings of .50 or greater to be considered as good representatives of a factor. Items that failed to contribute significantly to the extracted factors were deleted. Cross-loaded items were also eliminated. This is then followed by the application of Cronbach's Alpha Reliability Test to further assess and examine the internal consistency of the retained items.

Description of the sample

As presented in Table 2, the survey link managed to reach a total of 274 potential participants. However, six (2.2%) of them rejected to participate in the study. As tabulated in Table 3, of the 268 participants who initially agreed to participate in the study, 207 of them completed the questionnaire, representing 77.2% of overall completion rate.

Table 2

Overall participation rate for the survey questionnaire

Number of Participants Reached	Number of Participants Agreed to Participate in the Study	Overall Participation Rate (%)
274	268	97.8

Table 3

Overall completion rate for the survey questionnaire

Number of Participants Agreed to Participate in the Study	Number of Completed Questionnaire	Overall Completion Rate (%)
268	207	77.2

Demographic analysis

This section provides an overview of the demographic profiles of the respondents, as presented in Table 4. Based on the collected data, respondents from private HEIs slightly outnumber respondents from public HEIs, accounting for 50.7 percent as against 49.3 percent, respectively. Most respondents are majoring in visual communication design (43%), followed by digital and interactive design (31.9%), and advertising design (25.1%). From the ethnic group, the Chinese occupied the highest percentage (53.6%), followed by Malay (40.1%), and others (6.2%). 43 percent of the respondents are male, and 57 percent are female.

Descriptive statistics

Prior to executing EFA, the accuracy of the data entry, missing values, normality, and outliers were thoroughly reviewed. Skewness and kurtosis coefficients were also examined. Results revealed that the mean scores of the constructs ranged between 2.786 and 3.376. The construct that obtained the highest mean score was 'teamwork and leadership skills', and the lowest one was 'business fundamentals'. Standard deviation scores remained at .846 or below, indicating that all scores were close to the average. The minimum and maximum values for all constructs were the same, ranged from one to five. The skewness values ranged between -.737 and .229, while the kurtosis ranged from-.697 to .580. The obtained values were within the acceptable range of-2.0 to +2.0, suggesting that all items were normally distributed (Field, 2013; Garson, 2012). All these indicators suggested that the collected data were suitable for further analysis because no significant violation was discovered in the descriptive statistics.

Table 4

Frequency and percentages of respondents' information (N = 207)

	Variable	Frequency	Percent (%)
Study at	Private higher educational institution	105	50.7
	Public higher educational institution	102	49.3
Major in graphic design study	Visual communication design	89	43.0
	Advertising design	52	25.1
	Digital and interactive design	66	31.9
Race	Malay	83	40.1
	Chinese	111	53.6
	Indian	3	1.4
	Dusun, Kadayan, and Iban	6	2.9
	Others (e.g., Iraqi, Filipino, and Pakistani)	4	1.9
Gender	Male	89	43.0
	Female	118	57.0

EFA: Validity of the scale

Cognitive competency dimension

Table 5 displays the results of KMO and Bartlett's test of sphericity for CCD. The obtained KMO value was .950, fulfilling the required value of .60 (Field, 2013; Kaiser, 1960). The Bartlett's test of sphericity, χ^2 (171) = 2506.901, $p < .05$, suggesting that correlations between items were significantly large for factor analysis (Hair et al., 2010). All communalities were greater than .40 (ranged between .419 and .700), indicating that the items were well defined by the factor solution.

Table 5

KMO and Bartlett's Test of Sphericity results for cognitive competency dimension

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.950
Bartlett's Test of Sphericity	Approx. Chi-Square	2506.901
	df	171
	Sig.	.000

An initial analysis was run to obtain eigenvalues for each factor in the data. Surprisingly, two factors were found to have eigenvalues greater than one. The results suggested that two extracted factors accounted for 59.242 percent of total variance explained in the constructs analysed. In specific, the first factor explained 53.319 percent of the variance, while second one explained 5.923 percent. All items in CCD had loadings of .40 or greater.
However, a total of 11 items were eliminated for exhibiting factorial complexity on two factors (Tabachnick & Fidell, 2007). After the deletion of the items, further analysis was performed on the retained eight items. Table 6 presents the extracted factors along with their items for CCD. This two-factor structure was found to be accounted for 67.009 percent of total variance explained. While the factor one explained 53.771 percent of the variance, factor two explained 13.238 percent. The anti-image correlations ranged between .827 and .911, satisfying the requirement of .50 and above.

Factor one, which was initially labelled as 'business fundamentals', contained three hypothesised items. Interestingly, these three items were loaded substantially under this factor. However, an item 'identify current marketing trends about the targeted market segment', which was originally hypothesised on different factor, was loaded under factor one. The loadings of this item demonstrated practical and statistical significance (Hair

Table 6

Cognitive competency dimension factor loading, eigenvalues, variance explained, anti-image, means, and standard deviation scores

No.	Item	Factor Loading		MSA	Mean	SD
		Factor One	**Factor Two**			
1	Justify solutions to business problems after examining relative costs and benefits of all potential solutions.	.875		.832	2.749	.946
2	Recognise the role of relevant professionals in the functioning of a business.	.781		.869	2.855	.970
3	Identify current marketing trends about the targeted market segment.	.752		.868	2.971	1.024
4	Understand what makes a business to be profitable.	.739		.904	2.754	1.039
5	Understand how design elements and principles are useful for constructing meaningful visuals.		.868	.827	3.290	.931
6	Comprehend the standards of good typography.		.703	.882	3.116	.912
7	Demonstrate an in-depth understanding of design thinking and process.		.687	.869	3.048	.817
8	Understand the connections between graphic design and sociology, psychology, and other relevant disciplines.		.657	.911	2.990	.914
Initial Eigenvalues	**Total**	4.302	1.059			
	% of Variance	53.771	13.238			
	Cumulative %	53.771	67.009			

Note: Extraction Method: Principal Components Analysis. Rotation Method: Varimax with Kaiser Normalization.
MSA = Measures of Sampling Adequacy (Anti-image Correlation). SD = Standard Deviation

et al., 2010). Since this study keens on seeking for an empirical exploration rather than a theoretical solution, therefore, this item was retained in factor one. To describe the meaning of all items more effectively, this factor was relabelled as 'commercial awareness'.

Pertaining to factor two, which was labelled as 'design fundamentals', three items were originally hypothesised on this factor. All three items were loaded accurately under this factor. However, an item that was initially indexed on another factor, was loaded on this factor. This item was 'understand the connections between graphic design and sociology, psychology, and other relevant disciplines. With the same reason as stated above, this item was retained in factor two. Consequently, factor two was relabelled as 'integrated design knowledge' to better represent the overall meaning of the items.

Functional competency dimension

A summary of the results of KMO and Bartlett's test of sphericity for functional competency dimension is presented in Table 7. The sample size was deemed as sufficient to examine the factor structure because the KMO measure of sampling adequacy yielded a value of .950. The appropriateness of the data for factor analysis was supported the Bartlett's test of sphericity, χ^2 (300) = 3377.989, $p < .05$. Furthermore, communalities for each item were determined. It was found that the results ranged from .503 to .727.

Table 7

KMO and Bartlett's Test of Sphericity results for functional competency dimension

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.950
Bartlett's Test of Sphericity	Approx. Chi-Square	3377.989
	df	300
	Sig.	.000

Three factors were found to have eigenvalues greater than one in FCD. These three extracted factors explained 60.510 percent of the variance. Each factor explained 50.209 percent, 5.276 percent, and 5.026 percent of the variance, respectively. Based on the results, all items met minimum factor loadings of .40 or above. However, a total of 11 items were discarded because they were cross loaded on two factors. Accordingly, 14 items were retained in FCD for further analysis. The results revealed that the three-factor structure accounted for 65.754 percent of total variance explained. Each factor explained 49.866 percent, 8.568 percent, and 7.320 percent of the variance, respectively. The anti-image correlations for all the items in FCD were above .50, ranging between .883 and .966. Table 8 displays the analysis results for FCD.

Factor one was a 'newfound' factor. There were eight items, which originally hypothesised on different factors, were loaded on this factor substantially. Their loadings ranged between .574 and .810. A closer examination of these items revealed that they represent the abilities to perform and manage day-to-day design process and tasks in the industry. As such, factor one was labelled as 'operational design process management skills'.

Factor two was originally labelled as 'graphic print production skills' that contained four items. Of the four items initially hypothesised on this factor, three items showed statistical significance of loadings (Hair et al., 2010). One item was discarded due to cross-loading issue. Three items were initially hypothesised on factor three, which was labelled as 'software skills'. Interestingly, all three items were accurately and significantly loaded under their hypothesised factor. No factorial complexity or low loading issues were found in association with this factor.

Personal competency dimension

Details of Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity results for PCD is tabulated in Table 9. The KMO yielded an ideal value of .945, while the Bartlett's test demonstrated statistically significant results, χ^2 (171) = 2444.515, $p < .05$. It was also found that the results of the communalities for each item ranged from .496 to .825.

An initial analysis was run to obtain eigenvalues for each factor in PCD. Only two factors were found to have eigenvalues greater than one. The two extracted factors accounted for 59.079 percent of total variance explained. In specific, the first factor explained 51.938 percent of the variance, while second one explained 7.141 percent. The loadings of all items in PCD were .40 or greater, ranged between .440 and .891. Nevertheless, the six items as listed below were eliminated due to cross loading issue. A further analysis of the retained 11 items revealed that the two-factor structure accounted for 62.299 percent of total variance explained. Each factor explained 52.028 percent and 10.271 percent of the variance, respectively. The anti-image correlations for all the items were above .50, ranging from .858 to .947. Table 10 displays the analysis results for PCD.

Factor one was a new established factor. Besides four items that initially hypothesised on 'emotional intelligence' were loaded substantially on factor one, interestingly, additional six items were also loaded on this factor. When examined more closely, it was found that all these items were interrelated, reflecting the ability of individuals to make sense of their own and others' personality, and to use this information to

Table 8

Functional competency dimension factor loading, eigenvalues, variance explained, anti-image, means, and standard deviation scores

No.	Item	Factor Loading			MSA	Mean	SD
		Factor One	Factor Two	Factor Three			
1	Assure the quality of the project deliverables at a minimal risk.	.810			.924	3.019	.990
2	Develop functional concepts to visualise intended messages or ideas.	.767			.940	3.068	.943
3	Conceptualize big idea to guide the focus of advertising efforts.	.762			.930	3.073	.955
4	Set priorities right to effectively handle multiple tasks according to their urgency.	.727			.940	3.232	.895
5	Develop creative advertising content for a campaign to achieve persuasive communication.	.710			.926	2.952	.907
6	Produce sketches, mock-ups, mood boards, mind maps, or other relevant visuals to clarify design specifications.	.626			.966	3.416	.925
7	Apply consistent art direction across a wide range of graphic media.	.616			.956	3.150	.860
8	Anticipate how users will interact with the graphical interface.	.574			.937	2.903	.875
9	Apply appropriate print finishing techniques to achieve desired outcomes.		.847		.883	2.879	.924
10	Liaise with printers to identify printing requirements.		.741		.911	2.768	1.068
11	Pre-flight print ready digital files for the intended output.		.720		.942	2.845	.958
12	Acquire video and audio software skills for time-based media production.			.767	.912	3.019	1.136
13	Possess up-to-date UI, UX, and other related software skills for websites, web-based applications, and mobile applications design.			.766	.902	2.473	1.051
14	Master essential graphic design software skills for effective image and layout manipulation.			.646	.944	3.208	.887
Initial Eigenvalues	**Total**	6.981	1.199	1.025			
	% of Variance	49.866	8.568	13.238			
	Cumulative %	49.866	58.434	65.754			

Note: Extraction Method: Principal Components Analysis. Rotation Method: Varimax with Kaiser Normalization.
MSA = Measures of Sampling Adequacy (Anti-image Correlation). SD = Standard Deviation

guide their actions and attain better results. As such, factor one was labelled as 'personal intelligence'.

Table 9

KMO and Bartlett's Test of Sphericity results for personal competency dimension

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.945
Bartlett's Test of Sphericity	Approx. Chi-Square	2444.515
	df	171
	Sig.	.000

Regarding factor two, which was labelled as 'aesthetic and visual sensitivity', three items were originally hypothesised on this factor. Interestingly, all three items were loaded accurately and substantially under this factor with no factorial complexity and low loading issues.

Ethical competency dimension

The results of the KMO and Bartlett's test for ECD are demonstrated in Table 11. A value of .910 was obtained for KMO, exceeding the required value of .60, and Bartlett's test produced statistically significant results, χ^2 (136) = 1603.691, $p < .05$, verifying the factorability of the

Table 10

Personal competency dimension factor loading, eigenvalues, variance explained, anti-image, means, and standard deviation scores

No.	Item	Factor Loading		MSA	Mean	SD
		Factor One	Factor Two			
1	Demonstrate self-control while confronting conflicts at workplace.	.757		.930	3.377	.921
2	Take initiative to seek feedback from co-workers for further improvement.	.749		.922	3.377	.926
3	Use mistakes as part of the learning process.	.745		.903	3.628	.936
4	Being flexible while interacting with others.	.738		.932	3.329	1.023
5	Adjust actions to deal with changing or unanticipated circumstances.	.713		.960	3.188	.880
6	Self-examine own capabilities truthfully.	.709		.934	3.382	.921
7	Handle constructive criticism gracefully.	.696		.943	3.130	.939
8	Recover quickly from setbacks.	.681		.947	3.198	.963
9	Being sensitive to behaviours of others.	.678		.921	3.348	.962
10	Display optimism when handing stressful work situations.	.629		.937	3.304	1.014
11	Make sound aesthetic judgment in design process.		.894	.858	3.155	.868
12	Demonstrate creative flair in developing artistic ideas.		.849	.871	3.111	.925
13	Show a good standard of art appreciation.		.803	.891	3.420	.967
Initial Eigenvalues	**Total**	6.764	1.335			
	% of Variance	52.028	10.271			
	Cumulative %	52.028	62.299			

Note: Extraction Method: Principal Components Analysis. Rotation Method: Varimax with Kaiser Normalization. MSA = Measures of Sampling Adequacy (Anti-image Correlation). SD = Standard Deviation

collected data. The communalities of the items remained at .40 or greater, ranged between .445 and .778.

Table 11

KMO and Bartlett's Test of Sphericity results for ethical competency dimension

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.910
Bartlett's Test of Sphericity	Approx. Chi-Square	1603.691
	df	136
	Sig.	.000

Based on the results of the initial analysis, it was found that ECD constituted of three factors with eigenvalues greater than one. These three extracted factors in ECD explained 58.272 percent of the variance. Each factor explained 42.978 percent, 8.097 percent, and 7.197 percent of the variance, respectively. A total of six items were omitted for showing cross loading and low loading issues. A further analysis was conducted on the 11 items retained in ECD. The results suggested that the three-factor structure accounted for 64.830 percent of total variance explained. Each factor explained 44.044 percent, 11.554 percent, and 9.231 percent of the variance, respectively. The anti-image correlations for all the items ranged from .789 to .927. A summary of the factor analysis results for ECD is tabulated in Table 12.

Factor one, which represented 'professional expertise', was originally constituted five items. All five items were loaded substantially and practically on their hypothesised factor showing neither cross-loading nor low loading issues in relation to the factor.

With regards to factor two, which was labelled as 'professional behaviours', nine items were originally hypothesised on this factor. However, only four items that demonstrated significant loadings were retained. Of the five discarded items, three items were found to have factorial complexity issue and the other two items faced low loading issue. Factor three contained two highly loaded items. Originally, this factor was labelled 'professional values' with three hypothesised items. One item was omitted for showing factorial complexity.

Table 12

Ethical competency dimension factor loading, eigenvalues, variance explained, anti-image, means, and standard deviation scores

No.	Item	Factor Loading			MSA	Mean	SD
		Factor One	Factor Two	Factor Three			
1	Provide professional guidance to clients about the sustainability of commercial activities.	.864			.810	2.957	.987
2	Minimise wastage through interpreting projects innovatively.	.812			.855	3.024	.916
3	Create graphic design solutions that can facilitate people's participation in civic life.	.633			.927	2.986	.906
4	Aware of essential labelling requirements for consumer products or packages.	.608			.920	3.217	.938
5	Make reasonable choices when designing a graphic artefact.	.569			.900	3.251	.833
6	Reject all type of plagiarism.		.755		.851	3.464	1.100
7	Describe own capabilities honestly.		.755		.902	3.502	.985
8	Make appropriate acknowledgement of authorship when others have co-created a design.		.715		.858	3.309	.971
9	Treat all designers with respect in fair competition.		.678		.875	3.705	.943
10	Refuse to engage in any type of discrimination.			.836	.789	3.406	1.033
11	Refuse to use deceptive marketing messages to promote products or services.			.833	.806	3.174	.929
Initial Eigenvalues	**Total**	4.845	1.271	1.015			
	% of Variance	44.044	11.554	9.231			
	Cumulative %	44.044	55.598	64.830			

Note: Extraction Method: Principal Components Analysis. Rotation Method: Varimax with Kaiser Normalization. MSA = Measures of Sampling Adequacy (Anti-image Correlation). SD = Standard Deviation

Meta-competency dimension

Table 13 presents the results of KMO and Bartlett's test for MCD. The obtained KMO value was .954, fulfilling the minimum required value of .60. Further, the Bartlett's test, χ^2 (378) = 3758.393, $p < .05$, suggesting that correlations between items were significantly large for factor analysis. All communalities were greater than .40, ranged between .442 and .671.

Table 13

KMO and Bartlett's Test of Sphericity results for meta-competency dimension

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.954
Bartlett's Test of Sphericity	Approx. Chi-Square	3758.393
	df	378
	Sig.	.000

An initial analysis was run to obtain eigenvalues for each factor in MCD. Two factors demonstrated eigenvalues of one or greater. The results indicated that two extracted factors accounted for 59.242 percent of total variance explained in the constructs analysed. Specifically, the first factor explained 53.319 percent of the variance, while second one explained 5.923 percent. Based on initial results of the analysis, a total of 15 items were omitted due to cross loading and low loading issues (Tabachnick & Fidell, 2007). Further analysis was run on the retained 13 items. Table 14 presents the extracted factors along with their items for MCD. This two-factor structure was found to be accounted for 60.437 percent of total variance explained. While the factor one explained 50.713 percent of the variance, factor two explained 9.724 percent. The anti-image correlations ranged between .897 and .965, fulfilling the requirement of .50 and above.

Six items originally indexed on different factors were loaded substantially on factor one in MCD. When examined more closely, it was found that all these items were interrelated, reflecting the capability of individuals to handle design or work-related problems creatively and critically. Consequently, factor one was labelled as 'analytical and creative problem-solving skills' to better represent the meanings of all the items.

Table 14

Meta-competency dimension factor loading, eigenvalues, variance explained, anti-image, means, and standard deviation scores

No.	Item	Factor Loading		MSA	Mean	SD
		Factor One	Factor Two			
1	Use evidence skillfully to justify decisions made.	.797		.938	3.222	.886
2	Avoid making biased judgments when lacking of robust evidence.	.745		.927	3.304	.950
3	Transfer learning between contexts effectively.	.741		.931	3.077	.827
4	Develop successful solutions to a problem by using up-to-date information.	.737		.914	3.058	.943
5	Devise clever ways to carry out design or related work tasks.	.709		.912	3.101	.827
6	Generate a number of original ideas through capturing unexpected insights.	.654		.965	3.145	.980
7	Select right channels to communicate with internal or external project stakeholders.		.760	.905	3.068	.873
8	Lead team members to deliver desired results.		.760	.931	3.213	1.011
9	Work productively in interdisciplinary teams to attain desired results.		.739	.942	3.237	.874
10	Speak in a manner that is clear, coherent, and concise.		.701	.960	3.203	.949
11	Appreciate the value of team diversity through respecting the backgrounds, talents, and opinions of others.		.701	.955	3.643	.886
12	Capture the main points of what others speak.		.693	.897	3.348	.906
13	Build a positive working climate to enhance teamwork experience.		.616	.925	3.411	.926
Initial Eigenvalues	**Total**	6.593	1.264			
	% of Variance	50.713	9.724			
	Cumulative %	50.713	60.437			

Note: Extraction Method: Principal Components Analysis. Rotation Method: Varimax with Kaiser Normalization.
MSA = Measures of Sampling Adequacy (Anti-image Correlation). SD = Standard Deviation

Factor two contained seven items that originally hypothesised on two different factors. Specifically, three items were from 'communication skills' and four items were from 'teamwork and leadership skills'. This pool of items showed practical and statistical significant loadings on factor two. To better illustrate the meanings of all these items represented, consequently, factor two was labelled as 'interdisciplinary collaboration skills'.

Cronbach's Alpha: Reliability of the scale

Field (2013) recommended that one of the crucial steps for researchers to do after factor analysis is to check whether the scale is reliable. Reliability refers to the consistency of the items in producing similar results under different situations (Kimberlin & Winterstein, 2008; LeCompte & Goetz, 1982). To achieve a good reliability, the generally accepted Cronbach's alpha value is .70 or higher (Hair et al., 2010). However, Nunnally (1978) and Flynn et al. (1990) suggested that a reliability value of .60 or above enough for a new scale. Details of reliability statistics for each construct are presented in Table 15.

All constructs in this scale obtained relatively high internal consistency. All the values were above .70, ranging between .723 and .914. The construct that achieved the highest reliability value was 'personal intelligence', while the lowest one was 'software skills'.

Discussion

This section discusses the five competency dimensions and the retained items after the analysis. Cognitive competencies refer to the acquisition of relevant knowledge, awareness or understanding, and the capability to apply these effectively in work-related situations (Cheetham &

Table 15

Reliability statistics for the constructs in each competency dimension

Dimension	Construct	Cronbach's Alpha		No. of Items
Cognitive Competency Dimension	Commercial Awareness	.854		4
	Integrated Design Knowledge	.793		4
			Total	**8**
Functional Competency Dimension	Operational Design Process Management Skills	.903		8
	Graphic Print Production Skills	.819		3
	Software Skills	.723		3
			Total	**14**
Personal Competency Dimension	Personal Intelligence	.914		10
	Aesthetic and Visual Sensitivity	.873		3
			Total	**13**
Ethical Competency Dimension	Professional Expertise	.817		5
	Professional Behaviours	.797		4
	Professional Values	.746		2
			Total	**11**
Meta-competency Dimension	Analytical and Creative Problem-solving Skills	.884		6
	Interdisciplinary Collaboration Skills	.860		7
			Total	**13**

Chivers, 1996; Cheetham & Chivers, 1998). The findings showed that there are two constructs in CCD, namely 'commercial awareness' and 'integrated design knowledge'. Each construct has four performance indicators. In general, design as a discipline can be applied broadly across business function (Conley, 2004). A recent survey indicated that graphic designers in the United States have a strong interest in business-related knowledge (Google et al., 2017). On the one hand, the designers want to strengthen the business operation and marketing of their companies. On the other hand, they intend to offer strategic business development services for their clients. Such kind of services may include proposing innovative ideas to clients with regards to the internal systems of their businesses, product and service offerings, and consumer experience (Keeley, 2013). Therefore, it is no surprise that 'commercial awareness' was identified as a vital area of understanding for GD graduates in this study, which is in consistent with previous studies (e.g., Pirotti & Venzin, 2016; D'Amico, 2018; Dziobczenski & Galeotti, 2017).

The young practitioners are unlikely to be able to fulfil the demands of commercial clients in a competitive marketplace if they only know how to produce beautiful crafts (AIGA, 2015; Cheung, 2016). In addition, long-established knowledge in a discipline is always essential for employment in most industries (Ramírez, 2012). Therefore, any graduate of a GD programme is expected to possess a good understanding of design elements, principles, and thinking process to produce layout for various types of media (D'Amico, 2018). Apart from the 'traditional knowledge', interestingly, one of the performance indicators implied that GD graduates in Malaysia should also acquire knowledge from a broad range of disciplines. This simply means that young practitioners need to learn more than they once had to learn.

Functional competencies refer to the ability to perform a variety of work-related tasks using available technologies and tools to achieve specific outcomes (Cheetham & Chivers, 1996; Cheetham & Chivers, 1998). The findings suggested that GD graduates in Malaysia are expected to possess a varied skill set in areas ranging from operational design process management to software and graphic print production. There is a typical series of tasks that graphic designers perform in the design process to produce technically and conceptually sound visual solutions. Interestingly, these tasks were represented by the indicator (1) to (6) – from user investigation to idea generation, content development, concept visualisation, and design actualisation. Since the 'traditional' role of GD is to create functional and beautiful visuals to communicate messages and information (Cezzar, 2017), this explains why operational design skills are perceived as highly important by employers of graphic designers in Brazil (Dziobczenski et al., 2018), United Kingdom (Dziobczenski & Person, 2017), and United States (Bridges, 2016). Similarly, these findings also align with the survey results conducted by Bohemia (2002) that employers mainly search for operational contributions from industrial designers, such as to enhance the physical look of the products. As also implied by the indicator (7) and (8), the design process needs to be managed effectively and efficiently. Past studies (e.g., D'Amico, 2018; Dziobczenski & Galeotti, 2017) showed that GD graduates who can adhere to deadlines, establish priorities while handling multiple tasks, work within resource constraints, and always assure the quality of the project deliverables are expected to have an advantage while seeking employment. Moreover, software skills are needed for every GD gradu-

ate to create commercially and professionally acceptable works. The quality of the design outcomes or deliverables depends highly on the ability of a designer in performing the required software. The results of this study, coupled with the findings of past studies on software skills, indicated that the operational roles of graphic designers, i.e., to produce visually appealing design, remain important in the practice. The challenge for GD education is to produce versatile graduates who can deliver both print and digital materials with up-to-date software skills to fulfil the demands. GD was traditionally viewed as a discipline that centred on printing (Neves, 2017). While contemporary graphic designers are encouraged to place more emphasis on producing digital design in a world that is increasingly digitalised, the findings demonstrated that print design is still having, and will continue to have its place today. The skills in the print production area cannot be overlooked while educating GD graduates.

Personal competencies refer to the acquisition of appropriate and observable social behaviours, desires, psychological impulses or emotions in work-related situations (Spencer & Spencer, 1993). Based on the results of the analysis, there are two constructs in this dimension, namely 'personal intelligence' and 'aesthetic and visual sensitivity'. The two constructs are represented by 10 and four performance indicators, respectively. 'Personal intelligence' is defined by Mayer (2008) as the capability to justify and use personal information or personality to strengthen individual's beliefs, actions, and life experiences. Ramneek's (2017) study suggested that as the world of GD becomes more complex and harder to be defined and future is seeking for young practitioners who are aggressive, resilient, and compassionate, and can adapt and learn quickly. Specifically, he urged designers to display empathy for others as part of the adaptability process because it may help them to successfully handle conflicts, work in teams, align interests, listen effectively, make decisions, solve problems, and drive change. On the other hand, GD is transforming from a craft-oriented profession into a discipline that is focused more on conceptualisation, development, and implementation of innovative ideas for problem-solving. As discussed earlier, the integration of knowledge from other disciplines is particularly important in this process. However, this does not mean that GD should abandon its very own heritage (Muratovski, 2016). Friedman (2012) argued that successful design is a marriage between craft-oriented and scientific ways of working. This argument means that it is also essential for graphic designers to cultivate a good artistic sensitivity to make sound aesthetic judgment in the design process (Dziobczenski & Person, 2017).

Despite ethics and values are crucial for professional design practice and development, McCollam (2014) claimed that they have always been overlooked in the education of graphic designers. Likewise, previous qualitative studies by Chiang et al. (2016) and Chiang et al. (2019) suggested that social responsibility of graphic designers in social, cultural, and environmental dimension was not extensively integrated into GD curricula in Malaysia. In adding to these discussions, the findings of the present study further reinforced the importance of educating ethically-minded graphic designers. In this study, ethical competencies can be described as the appropriate personal and professional values and the capability to make sound judgments based on these in given work-related contexts (Cheetham & Chivers, 1996; Cheetham & Chivers, 1998). The findings demonstrated that there are three constructs constitute of ECD. They are: 'professional expertise' (5 items), 'professional behaviours' (4 items), and 'professional values' (2 items).

Meta-competencies are those generic and overarching 'soft-qualities' (Boak & Coolican, 2001) that deeply embedded in learning and that enabling introspection and self-assessment (Brown & McCartney, 1995). They are of a higher level than other competencies and able to support the acquisition and development of other competencies. There are two constructs in this dimension, namely 'analytical and creative problem-solving skills' and 'interdisciplinary collaboration skills'. Each construct contains six and seven performance indicators, respectively. The job of a graphic designer has become increasingly challenging and important as a result of the development of global communication and advancement of technology. In response to this, the ability of graphic designers to apply analytical and creative thinking skills in the design or day to day working process to solve problems, make sound decision, and generate workable solutions are also becoming more important (Ciampa, 2010). Furthermore, 'communications skills' and 'teamwork and leadership skills' were discussed separately in most of the previous studies (e.g., Dziobczenski & Person, 2017), but surprisingly, these two skills were combined to form a bigger competency area in this study. A closer examination of the findings demonstrated that the indicator (1), (2), and (3) represent 'communication skills', while the indicator (4), (5), (6), and (7) represent 'teamwork and leadership skills'. In this current global economy, it is essential to "collaborate productively in large interdisciplinary teams" (American Institute of Graphic Arts, 2015), and these two skills are highly important for the GD graduates to interact successfully with others. Similar to previous studies on identification of the needed skill set for designers in general (Ramneek, 2017) and product designers in specific (Morrison et al., 2014), the findings of this study suggested that apart from fulfilling operational role, graphic designers may assume a more strategic or managerial role in contemporary and future design practice. D'Amico (2018) highlighted that teamwork is an important managerial skill required by future GD graduates, and that the ability to communicate clearly and interact effectively with other team members of the company and with relevant project stakeholders to satisfy the needs and demands of

clients from a wide variety of industries is as crucial as having an outstanding technical production capability.

Implications of the study

Both theoretical and practical implications were drawn based on the results emanated from the study. Theoretically, the present study has yielded a valid and reliable preliminary scale to measure the competency levels of new entrants to GD profession by conducting empirical analysis using survey data collected from existing final year GD degree students who study at HEIs in Malaysia. This scale is valid and reliable for GD related programmes providers at university level in Malaysia to investigate the mastery levels of the five major CDs of their graduates. In addition, interesting underlying factor structures for CCD, FCD, PCD, ECD, and MCD was discovered in this study based on the analysis of sample data. Such discovery is believed to have provided a new way of looking into the factor structures constituted of each CD for GD graduates. Further, studies on GD competencies did not disclose any previous initiative to consider the necessity of ethical related skills or knowledge for effective job performance. However, Cheetam and Chivers (1998:p.268) argued that that "no comprehensive [competency] model would be complete without an ethical component". The study contributed meaningfully to the literature through the inclusion of ethical dimension in the preliminary scale for measuring GD graduates' competency levels. Practically, though the developed measurement scale is preliminary in nature, it has many implications for GD education that are important for HEIs, design educators, policy makers, and students. The development of this scale is also crucial to the professional practice of GD in Malaysia.

Limitations and recommendations

The first limitation is the data analysis techniques used in the study. EFA and reliability analysis were employed to evaluate the validity and reliability of the proposed competency scale. However, these statistical analysis techniques are insufficient to test the theoretical foundations of a measurement scale (Segars & Grover, 1993). In other words, a confirmatory factor analysis (CFA) should be conducted to further evaluate the psychometric properties of the scale before it can be finalized.

The second limitation is a response bias in questionnaire design. The online survey constituted of 113 items (including demographic questions) and 31 pages. It was found out that the participants spent approximately 16 minutes on average to complete the whole questionnaire. Undeniably, some participants might not be able to sustain their focus until the end and therefore causing careless or random responses. In addition, this study used self-reported questionnaire, which might also lead to bias that could distort the obtained results (Karpen, 2018; Kountur, 2016). The study was unable to ensure that all participants would examine their knowledge and skills truthfully and to detect if they managed to estimate their abilities accurately. Therefore, there was a possibility that the collected responses might be inconsistent with the participants' actual competency levels. Accordingly, several recommendations were provided. The study focused only on reaching final year GD degree students who specialise in visual communication design, advertising design, digital and interactive design. However, Bridges (2016) pointed out there is a growing number of GD programmes concentrating on different media directions and levels, and this phenomenon has created 'confusions' in terms of what and how GD should be taught. As such, future replication studies may include students who major in different media directions or levels of study to enrich and strengthen the findings.

Currently, the developed scale could be used as a preliminary assessment tool to measure the competency levels of GD graduates. However, to further explore the construct validity of the questionnaire, an important next step will be to conduct CFA on item inter-correlations. This exercise is essential because, without further investigation, it will not be possible to enhance the accuracy and reduce the possible error of the scale. Further, it is encouraged to extend this study by exploring additional underlying factors under each CD. Such attempts are necessary to increase the precision level of the assessment and improve the theoretical foundation of the measurement scale.

Knowledge and skills companies seek from designers might be affected by different national contexts. Besides, the competencies that a GD graduate must possess is always under refinement as the technology and consumer culture continue to progress. This means, it will be necessary to ongoingly retest and expand the findings of this study in other countries, and then observe how the competencies required by the graduates potentially changes in different national contexts over time. In addition, designers in different disciplines have different professional interests and contribute to companies in different ways (Buchanan, 2001). This suggests that future replication studies may also compare the required skill set of GD graduates to those in other disciplines of design. The goal of conducting related studies, as highlighted by Wang (2006:p.81), is to "impact the supply of well-educated workers, advance numerous careers, and provide students with high-quality education and potential for employment" in a world that is constantly changing.

Conclusion

Certainly, no single GD graduate is likely to possess all the employability attributes as identified by the study. Likewise, no employer expects a graduate to be fully prepared when entering the field. However, what do the employers really expect is a high degree of self-awareness. The graduates should understand how to leverage their strengths and improve their weaknesses to function more effectively in professional practice if they successfully get employed. In light of this, a valid and reliable scale is needed to accurately measure the competency levels of the graduates and provide them with meaningful information about their current strengths and weaknesses.

In conclusion, graphic designers around the world, including Malaysia, are trying hard to prove they deserve a "seat at the table" (AIGA et al., 2019:p.54). As compared to professionals of other disciplines, graphic designers are no exception to demonstrate and maintain a high standard of professional conduct, performance, and responsibility to society in their practices (International Council of Design (ico-D), 2020). In such a context, the required competencies for young practitioners should be evaluated and refined iteratively as the needs and demands of the professional practice are constantly changing. To achieve a satisfactory competency outcome, relevant stakeholders and front-liners such as HEIs, design educators, industry professionals, policy makers, workforce development bodies, and design associations should collaborate intensively and establish sustainable underlying strategies that provide the needed supports for GD graduates when they begin their professional careers. The study believes that the establishment of such strategies will ensure the consistent supply of qualified, matured, ethically-minded, and well-rounded young design practitioners to fulfil the demands of the practice in the future. Only then, GD profession in Malaysia will continue to grow, expand its sphere of influence, and ultimately gain the respect it deserves.

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