Validity and Reliability Test of Literacy Skills Assessment Instrument for Graphic Design Student

Asidigisianti S. Patria[(✉)], Ekohariadi Ekohariadi, and Any Sutiadiningsih

Universitas Negeri Surabaya, Surabaya, Indonesia
asidigisiantipatria@unesa.ac.id

Abstract. If students lack the ability in visual literacy skills, it affects the process and results in executing visual messages through their works. Students tend to be passive in finding visual references that can improve the quality of their work. The inability of students to perform visual literacy can lead to violations of intellectual property rights such as plagiarism. In this study measuring the visual literacy skills of graphic design students in the form of written tests in order to get a standardized assessment of students' visual literacy skills. The purpose of this research is to describe the validation and reliability of the Visual Literacy Skills assessment instrument for D4 Graphic Design students at Unesa. Content validation analysis using CVR, Item Rest Correlation with STATA Program and tested with IRT Rasch mode with CONQUEST Reliability software using Conbarch Alpha. The result is a CVR score between 0.5 and 1. The Alpha Reliability value exceeds 0.63. For the total item correlation test the results vary from 0.0011 to 0.5079 while the INFIT MNSQ Rasch model starts from 0.88 to 1.14. It was concluded that the written test assessment instrument proved empirically valid so that the visual literacy skills assessment instrument was feasible to use.

Keywords: Validity test · Reliability test · Visual literacy skills · Assessment instruments · Graphic design students

1 Introduction

Currently communication is very visual, images as a mode of communication, play a dominant role in daily activities. Literacy serves to strengthen the human factor in communication design to understand the social environment, so that visual literacy cannot be separated from the field of visual science such as architecture and visual communication design.

In order for the communication process in visual form to be conveyed accurately and correctly, designers need the ability to understand this form of communication. This ability is referred to as Visual Literacy. Basically Visual Literacy ability in general can be understood as the ability to understand a form of visual language and apply that understanding to communicate and interact with the environment. Visual Literacy in advanced understanding is media literacy and technological literacy, which develops

learning abilities and needs by utilizing visual and audio-visual materials critically and with dignity.

Weak visual literacy skills of designers can lead to confusion between the organizing process and the audience interpretation process. This increases the risk of messages not being delivered correctly. The field of graphic design is broad, students are taught various types of projects including: advertising, publication and visual communication as well as the development of signage, displays, and [1] typography. This diverse field requires designers to explore knowledge about different cultures in a project, so it takes creativity in the problem-solving abilities of graphic designers.

If students lack the ability in visual literacy skills, it affects the process and results in executing visual messages through their works. Students tend to be passive in finding visual references that can improve the quality of their work by reason of limited time or deadlines. The inability of students to perform visual literacy can lead to violations of intellectual property rights such as plagiarism in works by plagiarizing or only changing a few existing works. This has an impact on the good name of students and institutions.

Evaluation to measure visual literacy skills was carried out using observational techniques based on observations carried out by Khamadi and Setiawan who measured the visual literacy skills of design students while working [1]. Likewise, Sidhartani [2] observed art students in their work after providing a stimulus (example) before carrying out the work process. In this study, measuring the visual literacy skills of graphic design students in the form of tests (tests) in order to get a standardized assessment of students' visual literacy skills.

The test is an assessment procedure carried out by lecturers on students' knowledge and skills to determine their performance using certain instruments. As for the so-called instruments, there are various forms, they can be in the form of a set of questions that must be done or the task of producing a certain product. Exams can be carried out in various forms, intended to provide an objective measurement of the learning activities that have been carried out. The most common form of exam or test used by lecturers in testing students in class is a written test.

The development of an assessment instrument is an effort to develop an assessment instrument based on needs analysis. As new instrument, it is needed to be tested its effectiveness first so that it can produce a functioning and useful assessment instrument. To measure students' visual literacy skills of Graphic Design students, an assessment is needed [9]. This assessment uses the test method. Therefore, an assessment instrument is needed in the form of a question. The assessment instrument needs to be tested for validity and reliability to meet the standards of validity and reliability standards so that can be used for the next measurement stage.

Based on the background of the problem seeks to develop an assessment instrument to determine the visual literacy skills of graphic design students, then the purpose of this research is to describe the validation and reliability of the Visual Literacy Skills assessment instrument for Graphic Design students at Unesa.

2   Methods

This research is part of the research on developing visual literacy skills assessment instruments for graphic design students. The assessment instrument was developed based

on visual literacy aspects and indicators. Assessment instrument based on seven visual literacy skills Association of College and Research Libraries (ACRL):

1) Defining image need is a basic visual literacy ability in determining the nature and level of visual needs regarding the work to be made.
2) Finding and accessing images is the ability to find visual needs that have been previously identified, then access them effectively and efficiently.
3) Interpreting and analyzing images is the main ability to think critically in seeing a visual image.
4) Evaluating images is the ability to evaluate a visual image by analyzing the effectiveness, aesthetic and technical characteristics, textual information related to the image and making judgments about the truth and accuracy of the source.
5) Using images effectively is the ability to master the use of image which is usually done in designing design problems, presentations, design projects, and exhibitions.
6) Creating visual media is the ability to "write" visually that is to create a visual image.
7) Understanding ethical and legal issues is the ability to trace intellectual property, copyright, and fair use concepts when using visual images.

Content validity is the validity, that is questioning the suitability of the items in the test with the description of the material, is being taught. A question is said to have content validity if it measures certain specific objectives that are parallel to the material or content of the lessons provided. Content validity must cover the entire content, meaning that the test domain must not only be comprehensive in its content but also contain items that are relevant to the purpose of measurement [8].

Content validity of an item can be proven by using CVR. CVR Assessment of the instrument uses a Likert scale with a scale of 1–4, then the validator provides an assessment. The results of the validation assessment of each instrument from the validator were analyzed using the Content Validity Ratio (CVR). CVR is one of the approaches used to measure content validity in accordance with the results of the validator's assessment [10]. Lawshe's CVR (content validity ratio) is one of the widely used methods to measure content validity. This technique was developed by [3] proposed that each assessor/subject matter expert (SME) consisting of a panel of experts to answer questions for each item, so that the item has sufficient content validity:

$$CVR = \left(n_e - \frac{N}{2} \right) / \frac{N}{2}$$

CVR is the content validity ratio, is the number of validators who give an "important" value, N is the total number of validators. This formula returns values in the range from -1 to $+1$. A positive value indicates that at least half of the validators rated the item as important/essential. The greater the CVR value of 0, the more "important" and the higher the validity of the content.

Item-rest correlation was used to determine the relationship between items and the total scores on other items. According to [4], higher item-rest correlations in the test result in higher coefficients. Minimum required value of item-rest correlation is 0.20 for maximum performance test. This item-rest correlation analysis uses the STATA program.

Testing the reliability of the instrument used Cronbach's Alpha by calculating the reliability of student tests. The reliability test of this research instrument uses an internal consistency approach method because the respondents tried the test only once [5]. Reliability is determined by the value of the reliability coefficient. This reliability test uses the STATA program. Instrument reliability criteria if the reliability coefficient is minimum 0.6.

The fit test for each assessment item uses the Rasch Item Response Test Model. The Rasch model is also known as the one-parameter model. This model is used to analyze data that only focuses on the level of difficulty parameter [6]. Reliability is in the context of IRT/Rasch between one levels of ability with different abilities. The same test will result in different measurement reliability when administered to individuals with very high and very low abilities. The reliability value in Rasch modelling is indicated by the value of individual separation (person separation) and item separation. Individual separation shows how well the set of items in the test spreads along the logit ability range or continuum [7]. Rasch model is part of IRT which can be done with the help of CONQUEST program. Items are declared valid if the INFITMNSQ value is in the range of 0.5 to 1.30. The items in this range can be used to measure the visual literacy skills of Graphic Design students.

Empirical validity and reliability obtained by the developed instrument was obtained through instrument testing. The multiple-choice written test instrument was tested on 40 students of the D4 Graphic Design Study Program. Respondents were selected based on purposive sampling technique. So all 4th semester students of the class of 2020 became respondents.

3   Results and Discussion

Visual literacy skills assessment instrument is a multiple choice question to see students' visual literacy skills. The items refer to the seven visual literacy skills of the Association of College and Research Libraries (ACRL) with the details of the questions as follows:

1) Defining image need with the VL-D code found in the items vl1, vl2 and vl25.
2) Finding and accessing images with the VL-F code contained in the questions vl3, vl3 and vl 5.
3) Interpreting and analyzing images with the VL-IA code contained in the items vl6, vl7, vl8 and vl9.
4) Evaluating images with the VL-Ev code contained in the questions vl10, vl11, vl12 and vl13.
5) Using images effectively with the VL-Ef code contained in the items vl14, vl15, vl16, vl17 and vl18.
6) Creating visual media with the VL-C code contained in the questions vl18, vl19, vl20, vl21 and vl22.
7) Understanding ethical and legal issues with the VL-Et code contained in the items vl23, and vl24.

The validity of the content of the instrument is obtained by giving a questionnaire to experts, namely assessment experts, learning experts, design science experts and design

learning experts. The results of the analysis of the content validation test of the visual literacy skills assessment instrument conducted by 5 (five) experts (expert judgment). The results of the content validation test on 25 items of visual literacy skills assessment got the lowest score (0.5) and the highest score (+1). This value still meets the specified standard ($-1 < \text{CVR} < +1$). So that the 25 items (vl1–vl25) of the instrument can still be declared feasible and will then be tested for validity and reliability. The following is a table of test results for each item.

Based on the results of the item rest correlation test on the visual literacy skills measurement instrument of Graphic Design students in Table 1. It shows the lowest value of the rest correlation item is 0.0011 on item vl6 and the highest value on item vl3

Table 1. Results of CVR analysis and item rest correlation

Code		CVR	Item Rest Corr	Suggestion
VL-D	vl1	1	0.2653	maintained
	vl2	1	0.1477	Revised
VL-F	vl3	1	0.5079	maintained
	vl4	1	0.2027	maintained
	vl5	1	0.3456	maintained
VL-IA	vl6	1	0.0011	Revised
	vl7	1	0.0173	Revised
	vl8	1	0.0795	Revised
	vl9	1	0.0205	Revised
VL-Ev	vl10	0.5	0.0464	Revised
	vl11	1	0.0959	Revised
	vl12	1	0.0489	Revised
	vl13	1	0.4841	maintained
VL-Ef	vl14	1	0.5048	maintained
	vl15	1	0.1045	Revised
	vl16	1	0.1351	Revised
	vl17	1	0.3978	maintained
VL-C	vl18	1	0.2702	maintained
	vl19	1	0.3371	maintained
	vl20	1	0.0286	Revised
	vl21	1	0.0723	Revised
	vl22	0.5	0.0952	Revised
VL-Et	vl23	1	0.2344	maintained
	vl24	1	0.0758	Revised
VL-D	vl25	1	0.2062	maintained

with a value of 0.5079. There are 14 of the 25 items worth below 0.2 according to the suggestion that they should be revised, while the remaining 11 items are worth above 0.2, meaning that the items are feasible and maintained. The following is a recapitulation of the items based on the item rest correlation test results (Table 2).

Table 2. Recapitulation of the item rest correlation test results

	Question items
Under 0.2	vl2, vl6, vl7, vl8, vl9, vl10, vl11, vl12, vl15, vl16, vl20, vl21, vl22, vl24
Above 0.2	vl1, vl3, vl4, vl5, vl13, vl14, vl17, vl18, vl19, vl23, vl25

Table 3. Results of the Rasch IRT Model analysis

Code		Outfit (Unweighted Fit)	Infit (Weighted Fit)
VL-D	vl1	0.92	1.00
	vl2	1.01	1.01
VL-F	vl3	0.88	0.93
	vl4	1.11	1.02
	vl5	1.01	1.01
VL-IA	vl6	1.00	1.01
	vl7	0.98	1.01
	vl8	1.11	1.05
	vl9	1.09	1.03
VL-Ev	vl10	1.01	1.02
	vl11	1.00	1.01
	vl12	1.08	1.04
	vl13	0.94	0.95
VL-Ef	vl14	1.14	1.12
	vl15	1.06	1.04
	vl16	0.91	0.99
	vl17	0.97	0.97
VL-C	vl18	1.03	1.03
	vl19	1.10	1.02
	vl20	1.01	1.02
	vl21	0.96	0.99
	vl22	0.98	1.01
VL-Et	vl23	0.98	1.00
	vl24	1.10	1.03
VL-D	vl25	0.91	0.97

Table 4. Comparison of Item Rest Correlation Test Results with IRT Rasch Model

Code	Item Rest Corr	Outfit (Unweighted Fit)	Infit (Weighted Fit)	Conclusion
vl2	0.1477	1.01	1.01	maintained
vl6	0.0011	1.00	1.01	maintained
vl7	0.0173	0.98	1.01	maintained
vl8	0.0795	1.11	1.05	maintained
vl9	0.0205	1.09	1.03	maintained
vl10	0.0464	1.01	1.02	maintained
vl11	0.0959	1.00	1.01	maintained
vl12	0.0489	1.08	1.04	maintained
vl15	0.1045	1.06	1.04	maintained
vl16	0.1351	0.91	0.99	maintained
vl20	0.0286	1.01	1.02	maintained
vl21	0.0723	0.96	0.99	maintained
vl22	0.0952	0.98	1.01	maintained
vl24	0.0758	1.10	1.03	maintained

Based on the value of the item test results Outfit (Unweighted Fit) the highest was on item vl14 with a value of 1.14 and Infit (Weighted Fit) was worth 1.12 while the lowest was on item vl3 with a value of Outfit (Unweighted Fit) 0.88 and (Weighted Fit) was worth 0.93. It shows all items have a value between 0.5–1.3, which means that all items are useful for measuring the visual literacy skills of Graphic Design students (Table 3).

Based on the item rest correlation test, there are 14 items whose value is below 0.2, which means that the items should be revised, but if you look at the results of the analysis using the Rasch IRT model, the 14 items are still limited from 0.5 to 1.5. So that the 14 items can still be maintained and do not need to be revised and can be used to measure the visual literacy skills of Graphic Design students more broadly (Table 4).

The reliability test of the visual literacy skills assessment instrument used Cronbach's Alpha. If the alpha value > 0.6 then the instrument is reliable. The test result is 0.6354, this indicates that the instrument for measuring the visual literacy skills of Graphic Design students is reliable and can be used widely.

4   Conclusion

The visual literacy skills assessment instrument in the form of multiple choice questions was declared feasible based on the content validity value based on the results of expert validation with a CVR score between 0.5 and 1. The scoring rubric was also declared reliable with an Alpha Reliability value exceeding 0.63. For test item rest correlation the results vary. There are those below 0.2 and above 0.2 while the INFIT MNSQ Rasch

model with a value of 0.5 to 1.5. It can be concluded that the written test assessment instrument is proven empirically valid so that the visual literacy skills assessment instrument is feasible to use because it has fulfilled the requirements in the aspects of content validity, empirical validity and reliability.

Authors' Contributions. Asidigisianti Surya Patria and Ekohariadi conceived and planned the experiments. Asidigisianti Surya Patria carried out the experiments and the simulations. Ekohariadi and Any Sutiadiningsih contributed to sample preparation and contributed to the interpretation of the results. Asidigisianti Surya Patria took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

References

1. K. Khamadi and A. Setiawan, "Literasi visual dalam proses berkarya mahasiswa desain," *Demandia J. Desain Komun. Vis. Manaj. Desain, dan Periklanan*, vol. 5, no. 2, pp. 166–193, 2020.

2. S. Sidhartani, "Literasi visual sebagai dasar pemaknaan dalam apresiasi dan proses kreasi visual," *J. Desain*, vol. 3, no. 03, pp. 155–163, 2016.

3. C. H. Lawshe, "A quantitative approach to content validity," *Pers. Psychol.*, vol. 28, no. 4, pp. 563–575, 1975.

4. F. M. Lord and M. R. Novick, *Statistical theories of mental test scores*. IAP, 2008.

5. K. Adamson and S. Prion, "Reliability: Measuring Internal Consistency Using Cronbach's α," *Clinical Simulation in Nursing*, vol. 9, no. 5, pp. 179-180, 2013. Doi: https://doi.org/10.1016/j.ecns.2012.12.001

6. E. Elis Ratna Wulan and A. Rusdiana, "Evaluasi pembelajaran." Pustaka Setia, 2015.

7. B. Sumintono and W. Widhiarso, *Aplikasi pemodelan rasch pada assessment pendidikan*. Trim komunikata, 2015.

8. E. Almanasreh, R. Moles, and T. .F. Chen, "Evaluation of methods used for estimating content validity," *Research in Social and Administrative Pharmacy*, vol. 15, no. 2, pp. 214-221, 2019. Doi: https://doi.org/10.1016/j.sapharm.2018.03.066

9. F. Haanstra and A. Karpati, "A new tool for developmental assessment based on the Common European Framework of Reference for Visual Literacy – an international usability study," *International Journal of Education through Art*, vol. 14, no. 3, pp. 353-378, 2018. Doi: https://doi.org/10.1386/eta.14.3.353_1

10. V. Zamanzadeh, A. Ghahramanian, M. Rassouli, A. Abbaszadeh, H. Alavi-Majd, and A. Nikanfar, "Design and Implementation Content Validity Study: Development of an instrument for measuring Patient-Centered Communication," *JCS: Journal of Caring Sciences*, vol. 4, no. 2, pp. 165–178, 2015. Doi: https://doi.org/10.15171/jcs.2015.017