

# DATA VISUALISATION AND VISUAL DESIGN FOR INFORMATION EXTRACTION IN TRADITIONAL PRINT PUBLICATION AND DIGITAL CULTURE

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**Abstract.** The subject of this study is on information design and data visualisation. The aim of research is to understand perspectives of visual design in improving critical visual literacy. The objective of study is to identify various perspectives towards critical visual literacy among audiences who have access to print publications, but who are increasingly migrating to digital media platforms. In the overview of literature, this paper will be reviewing a wide range of scholarly works from authors who have effectively identified the role of data visualisation in audiences' use of print and digital media to extract information. A mixed-methods approach is utilised for research methodology. The first method is a case study of a century-old natural science publication. German biologist Ernst Haeckel's 1904 double volume of lithographic prints, *Art Forms in Nature*, will be critically discussed. The second method presents the results of a survey of Malaysian audiences' attitudes and perceptions towards visual information, and the key factors that foster and hinder information extraction and medium use, specifically aspects of convenience and layout design. Respondents were also queried on the functionality and importance of digital media for the purpose of knowledge, research and information gathering. Analysis of survey findings show that there is still a limited scope of understanding audiences' challenges with both lexical (reading) and visual literacies. This dilemma is essential for visual designers to acknowledge, in the context of mapping the functions of data visualisation for designing information in publications. Among commercial publishers, particularly those in digital publication sectors, the current impact of digital visual culture on traditional print publication suggests that this dilemma must be further studied to understand future implications of data visualisation and visual design on audiences seeking knowledge and information. Some recommendations will be provided.

**Keywords:** *information extraction, publication, visual design, visual literacy, visualisation*

## Introduction

Publication design is an industry that has endured through intense shifts of economic, social and technological priorities, resulting in deep struggles among visual designers coping with rapid advancements experienced as societies progress and develop. A growing dependence on contemporary publishing technologies has create multiplier effects on traditional print culture; the process of visualisation and information extraction being one that has created many debates both in design and media industries. Print publications such as books, magazines, and newspapers have been supplanted by digitally accessible and web-based information, available one click away. While information extracted online are increasingly perceived as legitimate sources of knowledge about many fields of learning, print publications would be seeing its relevance affected.

Crossick and Kaszynska (2016) reported that the more digital technologies dictate the value of new communication mediums as essential cultural experiences for twenty-first century existence, the less would traditionally print material be sought as the *critical source of information* in the future. Instead of gaining information from credible

sources, many are opting for digital downloading and lesser or lower quality reproductions of prints, graphics and photographs. In extracting information, the instantly compelling visual power of infographics, charts and images has demonstrated better abilities of audience engagement that purely verbal reasoning functions and processes such as reading print materials, may not offer, due to limitations of time constraints, access to cost-effective and credible sources, knowledge expertise, cognitive skills of analysis and evaluation. The inevitable conflict between digital and traditional publications has resulted in cultural resistance and unwilling adaption among some stakeholders with preference for, and customary use of, traditional mediums, but at the same time, it offers consumers greater access and convenience among digital content users (Crossick and Kaszynska, 2016).

This research aims to understand the scope of inducements for visual extraction of information from print and online (Internet) sources, and how digital mediums impact perceptions of traditional print publication. Several research questions to be answered are: (1) What role do visual culture and data visualisation play in information extraction? (2) Why is visual literacy a necessary skill in extracting information in the digital age? (3) How are characteristics of digital publications affecting consumers' reading patterns?

### ***Literature review***

Visual is defined variously depending on its final goal or purpose. Oxford Dictionary considers its most common form to be “a picture, piece of film or any display used to illustrate or accompany” (Lexico Official Portal, 2021), while Creately Official Portal (2021) sees its potential to communicate information with clarity by improving the impact, understanding, appeal and credibility to intended or target audiences. The Education Resources Information Center (ERIC) (2014) published guideline on graphic design for researchers, cites Yale University statistician and visualiser Edward Rolf Tufte's explanation on information design as the *revealing* aspects in how information is presented to audiences that creates or contributes to narrative, clarifies, lends meaning, and contextualises relationships.

### ***Overview of visual culture theories***

The *International Visual Literacy Association* (IVLA), an interdisciplinary non-profit which publishes empirical studies on visual literacy research for field practitioners ranging from librarians, educators, computer scientists and graphic designers, describes vision competencies as “the set of abilities which enable the sharing of knowledge and culture through the effective search, interpretation, evaluation, utilising and creation of images” (Debes, 1969). Unless one's eyes are closed, images give an order. As an experience, the power of truly seeing helps consumers and users of visual materials to feel connected sensorially due to the power of gaze, of being basically ‘held hostage’ through sightings. Hence, visually literate professionals must consistently evaluate how images integrate with other sensory experiences to produce implicative messages in the minds of society who read (Pacey, 1983). How we see what we choose, arouses us; it is essentially mind training to retain information, to think, and to allow imagination and wonderment of the visions to determine understanding.

Visual culture theories are important in relating the notion of “gaze”, the act and motivation for seeing, to its effects on human behaviour. Visual as information tools has

been discussed by many postmodern culture theorists. Several notable recent contributions to the field have been produced. For instance, University of Oxford cultural geographer Gillian Rose explores the Freudian theory of *schopophilia* in her book, where the pleasure in looking is a characteristic of the human drive with which the sighted are born. Rose (2016) also critically considers the ways in which visuality go beyond seeing surfaces. As representations of “real, flesh and blood life” in the inexhaustible range of languages and texts, images are the sites of social and culturally determined experiences, either in the form of first-hand or second-hand witnessing by audiences (Rose, 2016). This encourages cultural debates challenging the real *objective* of communication through graphics, images, signs, and other symbolic representations today. Researchers in the past have established that being literate in visual enables the development of competencies to present data chiefly to command *attention*. This functional aspect of visual as the message, is a basic element justifiably as important as its usage to *accompany* language (lexical) content, and thereby, creates the notion that visuals’ informational value has no merit on its own.

### ***Role of data visualisation for contemporary media consumption culture***

The composition of colours, lines, and forms are part of the aesthetic value of designed visuals and images that serve the critical functions of conveying ideas, from stories and facts to suggestive emotions. However, issues faced by visual designers in the commercialisation of digital production have arisen as technology advances. Take the tradition of applying the *Rule of Thirds* (ROT) for visualising layout design of text pages. Experimental studies using computational evaluation of imageries (paintings, photographs) found that less constraints on visual composition such as the use of the ROT principles may not necessarily determine aesthetic quality and effectiveness; suggesting that digital or web-based publications that do not adhere to ROT do not necessarily affect saliency of viewers’ attention and emotions, but may just as effectively engage exploration of the subject that *do* apply the ROT principle (Amirshahi et al., 2014).

*Form* plays a crucial role in a postmodern media culture driven by new technologies (Poynor, 2006). From engrossment to understanding, the visuality of graphics in consumption culture today, are targeted to elicit varied experiences, sensorial, cognitive, etc. British graphic designer, typographer and author Rick Poynor argues that graphic is exponentially complicated for print mediums and screen interfaces today, as the demand for visual identity to be “in step with the needs and values of postmodern commercial culture” has resulted in audiences perceiving less value in designers’ legacy (Poynor, 2003). Visual outputs, littering the overcrowded digital environment of marketing, advertising, and branding, and in multimedia/social content genres, have become such “lavish” spectacles that the critical associations between traditional design practice and applied visual communication today is stepping into a less rigid, more transitory role. To paraphrase the dust jacket review of Poynor’s *Designing Pornotopia*, audiences encounter with the ‘sensual’ travel explorations of postmodern cultural reality, by consuming the sense of “contemporariness”.

With *function* becoming a lesser component of design, some visual critics question the very cultural *purpose* of visualisation systems. The diversity of cultural norms and ideological vies that determine how we read, comprehend, or interpret “what we see”, and other questions about visual’s significance, is regularly thrown open to debates. Sturken and Cartwright (2001) cite the self-aware, reflexive approach of American

photographer Cynthia (Cindy) Sherman whose message of “seeing our personas actively” as an example of audience’s construction of their identities using the visual technique of immersion through simulation. At the same time, visual communication scholar by Griffin (2008) found evidence to support his assumption that the amplified use and domination of images in twenty-first century is artificial as they are fleeting, and not necessarily capable of exerting influence on audiences, leading to his reflection that cultural development in an age of media literacy presumes a decrease in lexical (reading) literacy, but only among societies whose members have developed familiarity with media culture. Lexical literacy is not offset by familiarity with visual characteristics, surroundings, or contexts.

Evidence of this phenomenon has been studied by learning experts. Nation (2017) for instance, applied experimental psychologist theories to show that words are not experienced in “isolated vacuum[s]”, but in the context of the readers’ own unique social encounters with systems of spoken and written languages, in short, the visual word *recognition*, and how these are recognised and nurtured through lexical legacy. At the same time, critiques of visual methodologies such as educator Denise Newfield from University of Witwatersrand argue that visual literacy gain powerful “positioning” role when they are read *against* textual material. This concept of *elucidation* is an essential underpinning in media discourse studies, where visual materials bring audiences to a closer understanding of their semiotic choices of interpreting what they see, thus making images essential as “representations of reality, especially in social and political media, rather than functioning mainly for aesthetic appreciation (Newfield, 2011).

### ***Role of data visualisation for scholarship and research***

Boyne (2001) in an earlier decade borrowed Marxist theories to imply that one of the principal reasons for defending the older, analogue model of publishing has been the mounting *fetishisation* of commodities, the book becoming an *object* of covet and power, instead of the *subject* or skills (researching, writing, thinking, visualising, publication design) that form the apparatuses of modern knowledge. Some researchers suggest that while academia seems relatively aware about visual’s effectiveness, they are not keen to imply the importance of design values for publications such as journals. In *Using Visual Evidence*, Howell (2009) cite Routledge editor, Duke University professor and author David Morgan’s belief that conservatism in scholarly approaches could result in academic authors ignoring (or rejecting) image use in research, a notion that derives from assuming pictorial evidence isn’t important. This creates a persistent dogma that serious works of scholarship should not be associated with visuals.

Morgan further discusses the implication of knowledge value from the use of iconography, suggesting that audience reception to visual culture signifies an opportunity for deeper meaning making, as images signify cultural connections and “may, therefore, be [useful] as *evidence* to inform communities of the social facts or historical settings and moments that are often below the surface of consciousness” (Howells, 2009). Furthering this notion of ‘subversive’ intelligence is culture theorist Staniszewski (1995), who examines the visual thinking perspectives of Italian polymath Leonardo da Vinci, who claimed fame primarily as an inventor, but acknowledged his aesthetic roots. Ironically, she notes that da Vinci did not stinge from integrated an abundant of visuals on his scribbled notes describing the process of creating his masterpieces. Challenges of visual design practice for digital scholarship such as online journal database publications lie in the fact this system is repeatedly constructed and

reinforced by product and market distributors; socially connecting and dividing the craft workers of culture (authors, artists, designers) simultaneously.

Visual journalism educator at University of Miami School of Communication Alberto Cairo states that function is often a hindrance to perceptions of information. Cairo argues that visual designers' choice of forms in which information is encoded, such as charts, must operate *meaningfully* for the targeted users, based on what they are essentially supposed to do with them, which is to scrutinise the message communicated and to gain something of value. Cairo (2013) cautions designers to balance the practice of using 'safe and familiar' forms like pie charts, graphs, and infographics, with personal preferences for aesthetic visuals: "Aesthetics do matter, but aesthetics without a solid backbone made of good content is just artifice". Other visual studies have found memetic elements on digital media increasingly impactful for individuals with online social connections to engage with others in less formal and more "conversational" tone of messages, adding perceived value to the new media communication process (Reime, 2015).

### ***Characteristics of design in information visualisation for commercial publication design***

Referring to the collection of Berkeley Library Official Portal (2020), visuals are essential aspects which affect the finished design of print publications. Layout design of visual elements plays integral role in visual identity and shaping of aesthetic appeal for print materials, besides being an impactful complement to sound/text, as readers remember images faster in cognition processing. Good visualisation uses *sound* design form and is *appropriate* for the complexity of information depicted. Moreover, it should be *useful*, enabling meaning making through aesthetic appeal and stimuli that attract viewer's *attention* seeking cultural experiences (Moere and Purchase, 2011).

Skills of visualisation through layout design, for instance, promotes engagement with texts and creative visual forms advocate scrutiny of data elements that result in enhanced understanding and appreciation of texts, while developing audiences' critical viewing skills. For traditional publication design, visuals designed to shape professional knowledge must be carefully curated. For example, body and organ illustrations for medical books and journals are more than elemental data snapshots; the cutaways map and advances medical science's understanding of the relationships between spaces, bones and veins (Lutz and Gerber, 2006).

### **Materials and Methods**

A critical reflection of the research question was made. The key challenge was understood to be posed by public's own appreciation of the value of design and the art of print, which has decreased dramatically, in lieu of digital popularity. Based on research issue to be addressed, a mixed method of quantitative and qualitative approach was used to generate more accurate findings. Creswell (2016) states that quantitative methods are the inclination of researchers who wish to describe and interpret data using conditions in which clarifying the existing relationships between variables is crucial. Sequential explanatorily, a structured process for undertaking theories guide the research process is tested as part of the outcome, highlighting the realist approach to qualitative case study research.

## **Research design**

Sampling collected data from a random pool of individuals who mirror the attitudes and patterns of behaviour of the larger population. Objectivity is a factor enabling findings from the sample to be generalised. Analysis of data takes a deductive approach by statistically studying the calculated scores and this helps remove the subjective nature of biased interpretations which inductive methods of qualitative introduces, often affected by the specific cultural environment in which the subjects or participants live or work.

## **Methods of data collection**

Respondents who were targeted for the survey belong to the Generation Y (Millennials) and Generation Z, in the 18 to 35 age range. Approximately 30% of the Malaysian population are in the Millennial cohort. By conducting this study based on the targeted segment, it enables researchers to foresee the future pattern of dependence on visualisation design for information source among this group. Data gathered was tabulated to demonstrate similarity patterns in reading activities, preferences of publication format as reading mediums, and the dependency context from which information is sourced. Due to time constraints and physical limitations in reaching the respondents, an online questionnaire was designed to enable wider participation in producing attitudinal findings

## **Instruments for data collection**

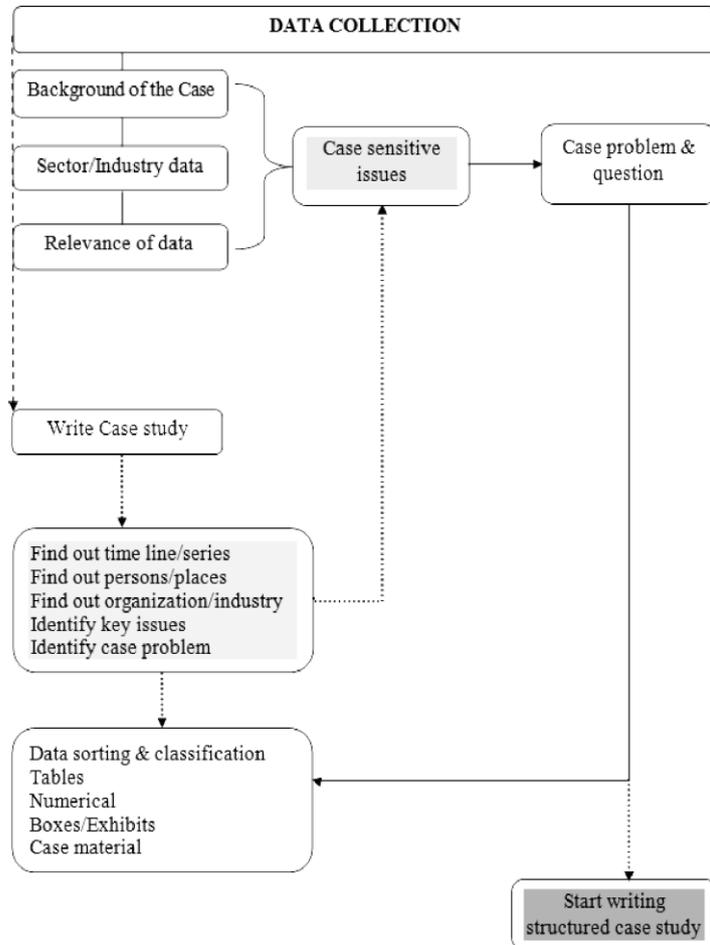
Primary research utilised descriptive and quantitative approaches by collecting survey data to analyse respondents' attitudes and perceptions about publication mediums and how layout design may affect information extraction when reading. The main purpose of survey to identify the traits of information preference between textual and visual, to detect longitudinal trends, research considered the degree which tech-savvy Gen Y and Gen Z spend time online, and to correlate their digital habits with the impact on reading mediums, as well as examining the preferential modes by which they gain information.

The online instrument comprised a survey of respondents' attitudes using the Likert ranking scale, along with open-ended and close-ended questions, enabling a range of responses that elicits critical opinion and reduces inaccuracy in collected data. Accuracy of findings was an advantageous outcome produced by online research methods, as digital data calculation generates automatic reports as soon as respondents replied each question in the questionnaire. With a 10-day timeframe to conduct the survey online, a total of 200 individuals, both male and female, responded. Results of tabulated findings are discussed in the following section to understand behavioural trends towards the studied issue.

## **Case study: 'Art Forms in Nature' by Ernst Haeckel**

Following from the secondary method will present a qualitative case study of a science publication, *Art Forms in Nature* by Haeckel (1974), published in German in 1904. Its eminence as a specialised genre is the use of visual illustrations to inform readers about microorganisms. This discussion seeks perspectives about the book's effectiveness in the use of visuals to attract readers while providing a fundamental way

to extract information. Data was collected through reviews commenting about this publication. The research seeks to explore principal issues from secondary sources from the viewpoint of researchers presenting case learning methods for instructional purposes (Reddy and Agrawal, 2012). Qualitative interpretations of reviewers’ opinions about the book as a visual phenomenon are analysed through applying key theories to correlate with insights from literature. The case study framework is shown in *Figure 1*.



**Figure 1.** Designing case studies.

Ernst Heinrich Haeckel (1834-1919) was an eminent German biologist from Potsdam, Prussia (Robinson, 2021). Scholars show the naturalist, an ardent advocate of Charles Darwin, investigating both evolution and zoological theories in intellectual depth, transferring his views of world conception to a range of field observations included biology, medicine, philosophy, and art (Haeckel, 1974). During the waves of scientific progress and industrialisation, while notions of materialism and utilitarianism crept into European conservatism, German thinking took a more idealist and romantic turn in late eighteenth- to early nineteenth-centuries, exemplified by philosopher Goethe, in viewing the human spirit as a “creative, organising force” (Berkeley Official Portal, 2021). Geometric shapes and natural hierarchy in nature’s forms, with their assumed logic and purpose that determined survival, are captured with exceptional precision and meticulousness in Haeckel’s drawings, and have continued to exert inspirational influence artists and designers to this day (Ball, 2007).

*Kunstformen der Natur* was a lithographic collection of plates (Haeckel, 1899), whose accuracy modern microscopes had long since confirmed (Figure 2). Published in between 1899-1904 in instalments, and later combined into a single volume, the illustrated plates were described by late naturalist Olaf Breidbach, Director of Ernst-Haeckel-Haus Museum in Jena, as *idealised* forms of “nature properly organised”, implying the imageries of aestheticism of nature as an end of itself (Ball, 2007). What made Haeckel’s work an eye-opening “debasement of historical art style” was the creative ways he chose to depict how European determinism worldviews collided in the spaces between Romanticism and science (Gontar, 2006). The publication systematically presents nature’s peculiar core attributes, while demonstrating Art Nouveau influences liberally.



**Figure 2.** *Kunstformen der Natur* by Ernst Haeckel.

It was not only well received by scientists, but by artists and architects. German photographer Karl Blossfeldt, French Art Nouveau designers René Binet and Emile Galle have recorded their indebtedness (Irmischer, 2018). Haeckel was commended by non-scientific reader segments for capturing popular imagination through epitomising biogenetics’ symmetries in the thousands of watercolours, drawings and sketches of microorganisms, and overall detailed presentation of living subjects as the key component of engaging and informing non-specialist audiences through strong visual impact (Breidbach, 2005). With pages arrayed according to geometric and evolutionary aspects, the book is fundamentally a classical vision of monistic pantheism, of the “unity of all existence” in nature’s diversity, executed with utmost delicacy (Carus,

1914). In reviewing its seventh edition published in 2008, comments range from awe of precision, to intrigue in Haeckel's near-surrealist visual reproductions of *nature as art*:

One participant (a writer) states:

*"I didn't read all the words, but I absolutely looked at all the pictures. [...] I felt like he rendered the natural world as something both amazingly beautiful and terrifying and I loved it. Totally want to have some of his work on my wall."*

Another participant (a YouTuber) states:

*"He dedicated his talent to faithfully reproduce the patterns he observed in nature; [unlike] the Faberge's eggs or the Sistine Chapel ... [His] art must be read not only with the eyes but also with the ears [...] and distinguished in sequence. It starts in a shyly but magnificent manner and finishes with a climax of colour and pleasure."*

Visual genres of non-fiction enable extraction of concepts and ideas and play a role in memory retention. However, readers disinterested towards visual intricacies could also take a less involved approach in considering its value as a product of cultural knowledge, participant (author-publisher) states:

*"Somehow this didn't wow me as I'd expected. The material is interesting re art, science, nature, and philosophy. [While] I enjoyed the prints, I didn't love them. I do recommend it to artists, naturalists, scientists, and anyone interested in the natural world and in art."*

For today's readers who have knowledge of visual communication, Haeckel's visual encyclopaedia may also be perceived as "constructed metaphors" for the freedom sought by artists and admirers from the weight of critical renderings of life-forms, contributing a refined sense of surrealist aesthetics in his concept of representation (Taggart, 2019). Applied interpretations of Haeckel's art are a contemporary aspect that adds value, providing inspirations for cultural products, such as the art of accessory and jewellery designer, Eddie Borgo (Herman, 2011):

*"The drawings are so beautiful because they are both organic and architectural. I'm always taking natural shapes and breaking them down into more linear forms, and this book sort of did that for me. The plates that really speak to me are a little more sinister, more broody ... almost gothic."*

*"The [legged] insects ... the scorpions and arachnids, directly influenced the silhouettes in my Fall-Winter collection. The way that Haeckel breaks these creatures down, they look so modern [...] up close. Some ... like the orchids and wasps are blurrier and harder to recognise ... but the spider is an easy one to see."*

## Results and Discussion

The demographic of 200 respondents was categorised by age, gender and status. The age segments in *Table 1* show a majority of 62% of respondents who participated were

in the age cohort of 23-27 years. The other age cohorts were 18-22 years (21%) and 28-35 years (17%). 63% were female, and 37% were male. In terms of status, participants who indicated they were studying, or working were 41% respectively, while the segment who were both studying and working was 17%. This combined with the age ranges, indicative of an urban population of university students and working adults in Malaysia. To examine the pattern of reading and information consumption, a question was posed to understand the reading culture among respondents. Respondents read substantially as indicated. In total, 90% stated they read, and 57% claimed they read every day. This is followed by 30% of respondents who claimed they read once a week. The context of habitual daily reading presumes that texts are generally from non-academic, mostly general sources (magazines and online articles), while newspapers or journals may not be preferred. The next question was aimed at describing the types of reading material the survey respondents prefer, which would give an indication for the mediums on which they accessed their preferences. To shed insight on the possible rationales this preference, it was presumed that the reading medium affected their choice of material. Hence, to describe the assumption with their behaviour, respondents were required to state the reason for preference.

**Table 1.** Collected survey results from respondents.

Category	Outcomes	
	Frequency (N)	Percentage (%)
What is your age?		
18-22	42	21
23-27	124	62
28-35	34	17
What is your gender?		
Male	74	37
Female	126	63
What are you doing?		
Study	82	41
Working	84	42
Both	34	17
Do you read?		
Yes	180	90
No	20	10
How often do you read?		
Everyday	114	57
Once a week	60	30
Rarely	26	13
What types of material do you read?		
Magazine, newspaper, etc.	26	13
Books, journals, etc.	66	33
Online reading materials	108	54
Does your profession require for you to read more?		
Yes	126	63
No	74	37
Do you find reading is difficult?		
Yes	40	20
No	160	80
Where do you always source your information?		
Online	80	40
Printable sources	0	0
Both	120	60

In *Table 1*, it is shown that 54% respondents' source reading materials from both digital and print. The medium preference stands in equal percentage, but slightly more than half (53%) indicated preference for online or digital mediums. The latter, encompassing e-books, e-magazines, blogs, websites, and online texts, gave convenience, accessibility, shareability and environmental consciousness as the main reasons.

*"Interactivity, save trees and easier to share with your friends and family."*

*"I spend most of my day using Internet."*

Those who chose print medium claimed they love the feel of handling a book, smell of the book and less strenuous for the eyes when comes to readability.

*"I prefer physically holding my material."*

Respondents' lexical skills may be explained by individual needs, and these reflect on their attitudes towards reading as either a necessary (professional requirement) or leisure activity. Considering the hectic lifestyles of Malaysians, the aim of this question is to seek respondents' opinions based on the assumed notion that reading is "not" an enjoyable activity due to time constraints. Referring to the *Table 1*, the survey shows that 63% of respondents admitting reading to be a professional requirement, while 80% claimed reading were not a difficult task. It could be assumed that 20% who answered negatively attempted to describe the challenge of reading from a lack of language mastery. This reveals an issue of literacy that may derive from the problem of staying focused; particularly if lengthy texts, attention deficiency and disengagement occur.

One respondent (a teacher) states:

*"The dwindling number of readers among Generations Y and Z is because reading is not emphasised as much as back then. We teachers try hard to bring back the reading culture [but] to no avail. Children, and even some of my peers, find it very hard to concentrate when reading. We have arrived at a time where technology has simplified our cognitive functions, creating shortcuts to retrieve information. What this means is that future generations are leaving books to turn dusty on shelves and waiting for novels to be adapted into blockbusters."*

The next question was the context of information source. It was aimed to understand the dependence of respondents on sources from which information is gained or extracted. This question helped to determine which mediums they prefer to use and may helpful indicate why. Referring to the *Table 1*, 60% prefer both options, 40% choose online only, indicating a duality in perceptions that print would be the chief source if digitally unavailable, but acknowledging the internet as the concurrent dependable source, 40% who chose online as their source of information stated the convenience of acquiring information and the wide range that are published digitally.

In *Table 2*, 50% strongly agreed that good layout help to attract readers, while 37% agreed. 47% agree on the factor that visualisation (applying more visuals in reading materials) was a factor that attracted reader. The application of visuals was a strongly

agreed factor among 40% respondents in terms of creating better understanding of text information. On the question of whether specific layout design should be applied for magazine publication, 53% agreed, while 23% strongly agreed, and 17% were neutral in their opinion. The final, open-ended question sought to understand perceptions of print's future survivability.

**Table 2.** Likert ranking scale was used to seek degree of differences in opinions about visual functionality for publication design.

Category	Do you agree?				
	Frequency, N (Percentage, %)				
	Strong disagree	Disagree	Neutral	Agree	Strong agree
Good layout helps to attract more readers.	20 (10)	0 (0)	6 (3)	74 (37)	100 (50)
Applying more visuals help attract more readers.	14 (7)	0 (0)	14 (7)	114 (57)	60 (30)
Applying visuals help people understand better.	20 (10)	0 (0)	6 (3)	94 (47)	80 (40)
Specific layout design should be applied specific types of magazine.	14 (7)	0 (0)	34 (17)	106 (53)	46 (23)

The opinions of participants take a largely negative perception of this issue. Two examples:

*“It depends largely on the source. Newspapers are dying, as the news by the time it is printed is too old. Magazines are dying and will die eventually as more discipline-specific blogs that are “free” take its place. These sites work on a different business model, one that is not subscription dependent or is partially subscription dependent. Speed and accuracy of information and easy accessibility are reasons for why the online medium has become ‘the source’ as opposed to the print medium which has its charms in the form of tactile books.”*

*“Surviving, but [print will not be] as hype as before and will probably turn into an antique material. Like Vinyl.”*

### **Visual design creates information value**

Visual culture trends of viewing design aesthetics as the critical message, is developing unlike the linear development of traditional print and publishing sectors that have evolved tremendously from the fifteenth-until the twentieth century. Visual communicators, having an illimitable array of digital tools, are both challenged and saddled with society's deep desire to *solve problems for the twenty-first century*. The increase in consumption of digital and social media among younger demographics has had a huge impact on their use of traditional media. A notable difference was found between audience's patterns of media consumption. Traditional publications do not constrict time to read deeply, whereas digital mediums (apps and websites) require careful separation of facts from the emotional appeals that interactivity offers (Howell, 2009). While Internet accessibility facilitates new publishing trends, digital publications such as e-books and graphic novels included data from this research suggest that developing societies' digital media consumption are increasingly reliant on providing information factoring in convenience, accessibility, shareability and environmental

consciousness. Another assumption that applies in understanding consumers' visual literacy behaviour is the attention deficit issue towards lengthy textual material.

These findings suggest a description between the concepts of knowledge as cultural representation mainly deriving from a *functional* perspective. Information extraction is a necessity if the material is perceived as an important or essential functioning component of digital media consumption lifestyles; yet this necessary means of gaining knowledge should not exclude information gained when reading is done for *leisure*. Results from opinion-based enquiry about the survivability and value of traditional publications in the primary research noted that in the long term, print mediums and journal texts are not expected to be the main source of information for the increasingly advanced eras ahead, especially among digital communities who are not pursuing scholarly research. These expressed public opinions suggest a broader reality that traditional publication industries will likely fade in importance and value for society. Whether the issue is directly correlated to environmental, or cost concerns, printed materials and publications are likely to experience a marked downturn as the main *source of choice* when audiences require materials to extract knowledge from, with digital mediums becoming the preference of most users.

As demonstrated in literature, and gleaned from primary insights, visualisation of data conveniences and simplifies audiences' understanding of information, but distances them from appreciating the value of design practitioners. In future, this may contribute to lowering literacy skills development of social groups such as youths. Hence, digital publishers must be agile in tapping into opportunities and approaches for socially beneficial information transfer. To revitalise interest in traditional publishing, more flexible rules of layout design could be adapted by visual communication designers. Publishers who are financially and technologically capable to remove once-rigid boundaries of the sector must promote data visualisation design techniques for its potential represent diverse areas of knowledge and to further enhance the value of digital publications in the service of reading publics. In this regard, Poynor (2004) urges research academics working with lexical texts and visual designers to find commonality of language, stating: "There is a difference between subtle and complex, the more difficult the ideas, the greater the need for clarity."

## Conclusion

From the symbolic and ritualistic portrayal of the subject of gaze of past painters and artists, to audience's increasing power and participation in new media, the pure cultural products of the past such as print publications must shift to the next paradigm in the continuum for human knowledge development. Through research and findings in this paper, visual usage is described to affect ways society extract and engage in information. Should publication design industry still be dependent on print's "charms", with readership upheavals as a result of democratisation of digital technologies? Will the traditional publication industry survive for years or go extinct? The value of design in publishing should not be taken lightly, even if technology predominates. Print materials using cheaper paper, poor bound, poor typeset, and inadequate margins etc., negates the value of good design in publications. In order to effectively leverage the experience of reading in future, books will survive, yet its purpose will remain in a flux.

In fields requiring constant knowledge updating, collation, production and research communication, there exists considerable issues of whether print materials today could

truly represent information *intelligently* for the audiences exposed to digital technologies, or whether new media practices such as computer-generated templates, infographics, digital visual mapping of data will invariably be the future of information processing. Not least, the parameters of visual usage today require communicators to be mindful of practice integrity, and commercial designers need to approach cultural image-making meaningfully, as poor understanding of visual representations result in damaging perceptions with misleading and fraudulent information (Welsh and Wright, 2010). As the *American Institute of Graphic Arts* (AIGA) Standards of Professional Practice Association affirms:

*A professional designer shall represent messages in a clear manner in all forms of communication design, ... [and shall] communicate the truth in all situations, and at all times.*

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The author confirms that there is no conflict of interest with any parties involved with this study.

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