



A study on the usage of pictogram designs in hospitals:

A tool for communication

Rituraj Taye¹, Archana¹, Kanchan Deori², Desh Deepak Singh³

¹*Amity School of Communication, Amity University Rajasthan, Jaipur, India*

²*Nursing Officer, PHC*

³*Amity Institute of Biotechnology, Amity University Rajasthan, Jaipur, India*

rituraj.taye63@gmail.com, archana.paswan@gmail.com, kanchandeori458@gmail.com,

ddsbms@gmail.com

Abstract

Communication with the patient and the visitor is very important, especially in the case of a person visiting a hospital for various purposes. The communication system inside the hospital should be very smooth and easy to understand for fast movement. To maximize the dissemination of the communication system inside the hospitals, pictograms are used to indicate the message for various department facilities available in the hospital. Pictograms are infographic design considered universal icons used in all the hospitals for the respective departments. Since the perception and the views of the visitors visiting the hospital are different in the Indian context, a comprehensive study needs to be carried out. The objective of the study is to find out the role and effectiveness of pictograms used inside Primary care (rural hospitals) and Secondary & tertiary Care (urban hospitals) for communication and find out how the audience understands the meaning of the pictograms under various cultural backgrounds. The study will also identify the variables that affect the level of comprehension among the target audience and whether it can be used as a tool for communication or is it a barrier for the people.

Keywords: Infographics, Health Care, Communication, Pictograms, Designs

Introduction

Information graphics, or infographics, are visual representations of information, data, or knowledge. Understanding infographics is relatively important and has become more challenging in the health sector. Health literacy is the degree to which individuals can process and understand basic information and services needed to make appropriate decisions regarding their health (Lynn 2004). People with low health literacy are likely to have even more difficulties with language/instructions specifically in health care. To communicate well inside the hospitals,

elements such as directional signs, floor signs, and directories help the users to determine the locations and to go around the building accessibly. Norman (1990) stated that a pictogram is better than a label text, and recognizing an image is easier than reading a text. Infographic designs such as pictograms have the potential to be interpreted more accurately and quickly than text. Pictograms are universal icons or illustrations that are used for common signs or signals. In hospitals, the use of pictogram icons is suggested because the use of scientific medical terms becomes difficult to understand, and if the meaning is not decoded correctly, it would create a wide gap among the visitors to the hospitals. But if the medical terms are converted into icons or images, it becomes easy for the audience to understand and interpret the meaning easily. It is always said that the visuals of any image are more meaningful as compared to text alone. Icons are more noticeable and understood more easily from a distance as compared to textual information. However, inappropriate designs might lead to problems for people with low literacy due to misconceptions. So, the designer must be sure that the pictogram is designed clearly. (Huang W. 2007) discuss that the understanding of infographics is relatively a new problem, and it has become more challenging when infographics appear as raster images. Images are inherently specific and have an in-depth meaning of their own. Images can portray more meaningful messages to the audiences with fewer words in them. Symbolic imagery and mood board images can counter the audiences for proper communication (McDonagh 2015). The article published by the author himself (Rituraj 2019) "Usage of Infographics in Mobile Business in Promoting & Branding Healthcare in social media" discusses the human brain's capacity to remember 80 percent of what it sees in visuals, versus 20 percent of what it reads. And health messages designed through infographics tend to deliver to the target audiences a lot more than simple text. In their survey, they also observed that approximately 40 percent of people respond positively to visual information rather than plain text in health care. Infographics are important and necessary for patients and the information graphics should be designed based on a specific goal.

Another article published by the author himself (Rituraj 2022 et al) "A qualitative evaluation of infographics and its uses in healthcare communication" discuss how infographics with visual representations of data, knowledge, or information deliver information quickly and clearly. Their study suggested that by using infographics, complex health information can be easily communicated to the general audience through a variety of platforms and has been proven to be incredibly effective in informing patients to better understand the procedures and pathological conditions of their diseases. Most Healthcare industries and professionals engage in infographics to explicitly communicate medical information to their patients.

However, inappropriate design pictograms with complex contents can cause problems for people with low literacy while basic pictograms can also cause a problem due to their recognition capacity. The below images are the representation of the text board and pictogram information used in the hospitals.



Image 1: Images of casualty, labour, ultra-sonography, and postnatal rooms indicated with text board in a rural hospital. (Picture credit: Images clicked by the author during hospital visits)



Image 2: Pictogram image with text information of various departments displayed in an urban hospital. (Picture credit: Images clicked by the author during hospital visits)

Statement of the Problem

India is a diverse country with many different cultures and dialects. The education level of the population also varies with the geographic location. When a visitor visits a hospital, there are numeric signage systems that are used for directing the visitors to go to the respective departments. This signage is a pictogram, an infographic design that indicates a message of the respective departments. For example, a patient with an eye infection who visits the hospital for eye care can go directly to the Department of Ophthalmology without seeking any help just by understanding the sign of the “Eye” used for ophthalmology. But sometimes the pictograms are difficult to understand due to their similarity and thus the chance of being misunderstood by the viewer is inevitable. In this case, it is important to find the role and effectiveness of pictograms used inside the hospital for communication.









Hypothesis












There is a strong association between the area (rural-urban) and the role and effectiveness of understanding the meanings and messages of the pictograms used inside the hospital for communication.

Materials & Methods

Before the survey, we visited multiple hospitals in rural and urban areas to collect the different types of pictograms used inside the hospitals for communication. Most of the Primary care (rural) hospitals like CHC's & SubCenters use fewer pictograms in the hospital because of the limited facilities and departments. They used a display board containing text information for mentioning the departments as shown in the image above (Image 1). Only in a few Primary Care (rural) hospitals, there is extensive use of pictograms for communication. While in Secondary & Tertiary Care (Urban) hospitals the use of pictograms is very common. Most of the pictograms are used to indicate the department related to the disease. Based on the pictograms, Questionnaires were developed to identify, select, and analyzed the response of the participants. The questionnaire was also tested in another environment other than the hospital to check the perception and interpretation of the pictograms used in the hospitals. We have conducted Qualitative Research and a survey method on 600 respondents who were present inside and outside the hospital premises. It includes academicians, students, and random people both from rural and urban areas. The sample for the study does not include the employees of the hospitals since they are very much familiar with the pictograms. It focuses on how the use of pictograms helps the visitors to understand the communication system inside

the hospitals. For the survey, we have selected 10 hospitals (5 from the rural and 5 from the urban). As per the visits to the hospitals, we have also identified 20 universal pictograms that are mostly used inside the hospitals for communication. The original pictures were replicated with the same computer graphic images in black and white because of the difference in color, size, and quality of the image used in different hospitals. Table 1 below shows the pictograms of the respective departments and facilities that were used for the survey. The following departments and facilities (Gynaecology, Radiology/X-ray, Operation Theatre, Wheelchair Facility, Nurse Station, Doctors Area, Pharmacy, Immunization, Laboratory, Cardiology, Maternity Ward, Otolaryngologist, Blood Bank, Dental Care, Outpatient, Ophthalmology, Ultrasound, MRI, In-Patient, Intensive Care Unit) were selected for the survey.

Pictograms	Name	Details
	Gynaecology	Gynaecology refers to the treatment related to female reproductive organs
	Radiology/X-ray	Radiology is the science that deals with X-rays to diagnose diseases
	Operation Theatre (OT)	Operation Theatre (OT) is a room where operations/surgery are performed
	Wheelchair Facility	Wheelchair Facility provides support to patients
	Nurse Station	The nurse Station is the place where on-duty nurses are available
	Doctors Area	Doctors Area is the place where on-duty doctors are available
	Pharmacy	A pharmacy is a store where medicines are sold
	Immunization	Immunization is the department where injections and vaccinations are given such as polio, hepatitis, etc

	Laboratory	The laboratory is the department that tests liquid samples like urine, blood, etc
	Cardiology	Cardiology deals with heart patients
	Maternity Ward	Maternity Ward is the place pregnant women are admitted
	Otolaryngologist	Otolaryngologist deals with the treatment of ears, nose, and throat
	Blood Bank	Blood bank supplies and receives blood
	Dental Care	Dental Care deals with the problems of the teeth
	Outpatient	An outpatient is a patient who comes to the hospital for treatment but does not stay back in the hospital
	Ophthalmology	Ophthalmology deals with eyes and related diseases
	Ultrasound	Ultrasound is a medical test that is used to capture live images from inside the body
	MRI	MRI is a medical imaging technique that deals with the organs within the human body
	In Patient	In Patient is a patient who stays in the hospital for medical treatment


	Intensive Care Unit (ICU)	ICU is a room where a patient is kept 24/7 under observation
---	---------------------------	--

Table 1: Recreation of 20 universal pictograms that are mostly used inside the hospitals for communication.

Analysis

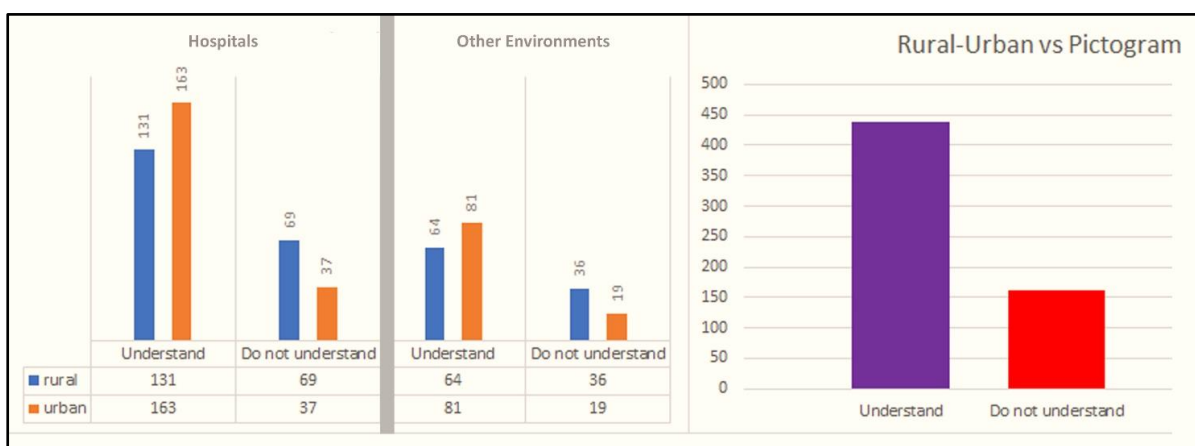
For the analysis, we have identified the respondents of two zones, the visitors of the rural and urban hospitals and the respondents of rural and urban areas of Jaipur, India. We have surveyed 600 respondents who actively participated in the survey. In total 400 respondents were interviewed in the rural and urban hospitals and 200 respondents from the other environments in both the rural and urban areas. During the interview, we used the 20 different pictograms that we collected. Firstly, we saw the pictograms of the different departments, and their responses were recorded manually. From the selected rural hospitals, there were 200 respondents out of which 131 could understand and interpret the meaning and message of the pictogram used in the hospitals while 69 could not understand and interpret the meaning due to various cultural backgrounds. From the selected urban hospitals, out of 200 respondents, 163 could understand and interpret the meaning and message of the pictogram used in the hospitals while 37 respondents could not understand and interpret the meaning. From the other environment (rural areas) out of 100 respondents, 64 could understand and interpret the meaning and message of the pictogram while 36 respondents could not understand and interpret the meaning due to various cultural backgrounds. From the other environment (urban areas) out of 100 respondents, 81 could understand and interpret the meaning and message of the pictogram while 19 respondents could not understand and interpret the meaning of the pictogram used in hospitals.

Table 2 and Graph 1 show the total number of respondents from both rural and urban hospitals and other environments in response to the use of pictograms in hospitals for communication.

	<p align="center">Selected Hospitals (200 participants from each zone)</p>	<p align="center">Other Environments (100 participants from each zone)</p>	
--	---	---	--

Zone	Understand	Do not understand	Understand	Do not understand	Total
Rural	131	69	64	36	300
Urban	163	37	81	19	300
					600

Table 2: Table 2 shows the total number of respondents from both rural and urban hospitals and other environments.



Graph 1: Graph 1 shows the total number of respondents from both rural and urban hospitals and other environments.

Table 3 shows that out of 10 selected hospitals of Jaipur, 3 rural hospitals are using pictograms & text boards for communication and 2 rural hospitals are not using any pictograms, but they are using only text boards for communication. On the contrary, 5 urban hospitals are using both pictograms and text boards for communication. Not all departments in the urban hospitals are represented with pictograms, but text boards were also used for communication in both Hindi and English language.

Zone	Hospitals using pictograms & Text Board	Hospitals use Text Board only and no pictograms
Rural	3 Hospitals	2 Hospitals
Urban	5 Hospitals	

Table 3: Table 3 shows the total number of hospitals using pictograms and text board details.

Table 4 shows the total number of male-female respondents from both rural and urban hospitals and other environments concerning the understanding/not understanding of the meaning of the pictograms used in the hospital. From the rural hospitals, there were 121 males and 79 females who responded to the questionnaire, and from the urban hospitals, there were 107 male and 93 female respondents. In the other environment, there were 101 male and 99 female participants. The male respondents in both the rural and urban hospitals and the other environments were more as compared to the female respondents because many of the females who were visiting the hospitals ignored the survey due to various reasons.

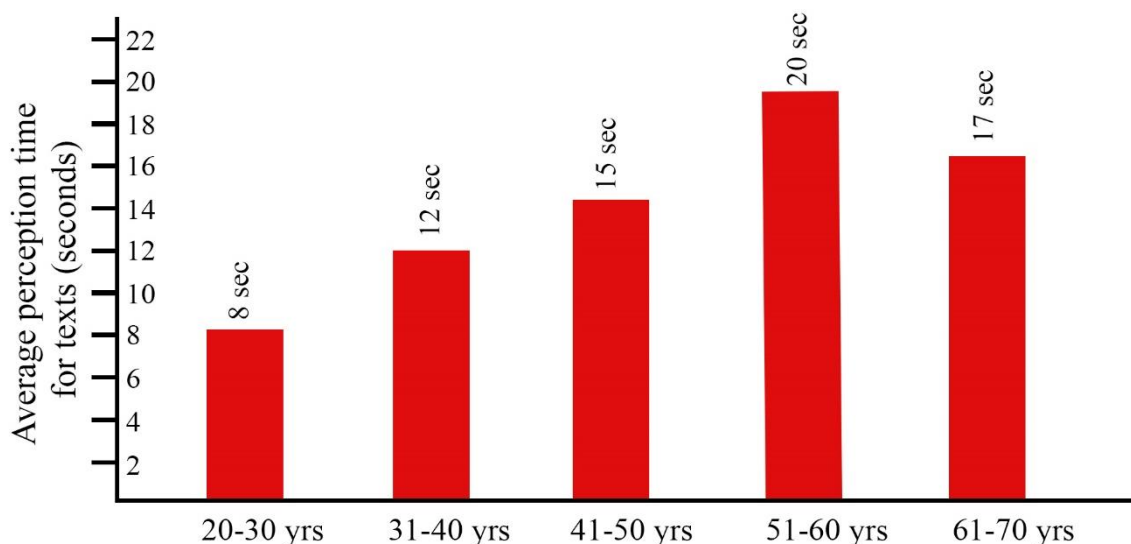
Sex Ratio	Male	Female
Rural	121	79
Urban	107	93
Other environments	101	99

Table 4: Table 4 shows the total number of male-female respondents from both rural and urban hospitals and other environments.

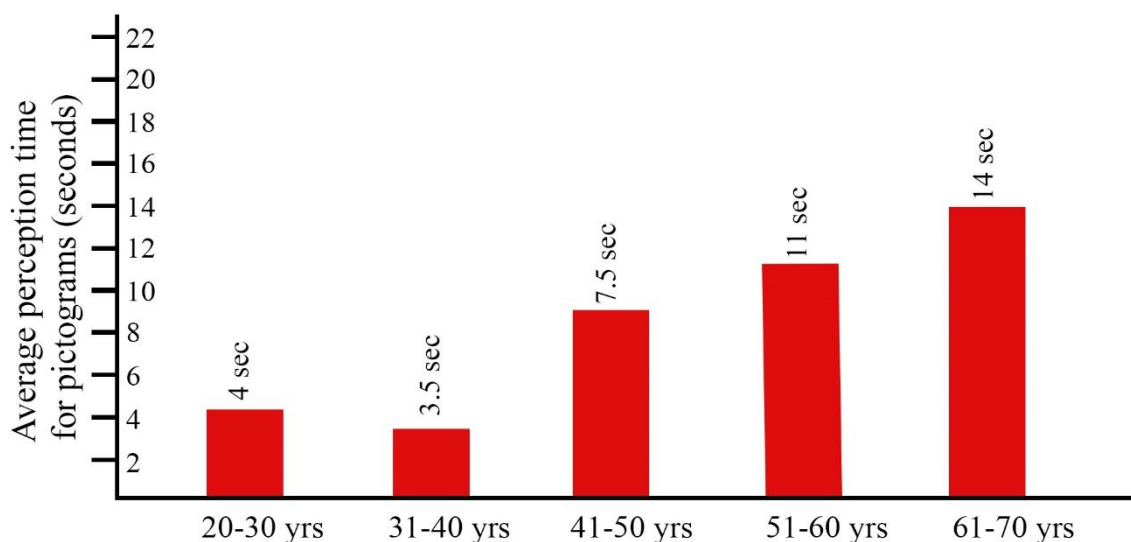
The participants from both the rural and urban hospitals and the other environments have different age categories. The age category was important in the research because the response rate of the pictograms and the text by the viewers were to be recorded. At first, we recorded the time taken by the respondent to respond to the pictograms and understand the message and secondly, we recorded the time taken to read the text and understand it. The response rate was different in both the categories and the understanding level which is shown in graphs 2 & 3.

Age Category	20-30 Yrs	31-40 Yrs	41-50 Yrs	51-60 Yrs	61-70 Yrs
Rural	40	57	53	37	13
Urban	31	49	61	41	18
Other environments	57	51	43	33	16

Table 5: Table 5 shows the age category of respondents from both rural and urban hospitals and other environments.



Graph 2: Graph 2 shows the age category and the average time taken to respond to the given text representing the departments and facilities of the hospitals.



Graph 3: Graph 3 shows the age category and the average time taken to respond to the given pictograms representing the departments and facilities of the hospitals.

The study also finds that the response rate of the pictograms presented responded quickly as compared to the text represented. The average response rate of the text between the age category 20-30 years is 8 seconds, 31-40 years is 12 seconds, 41-50 years is 15 seconds, 51-60 years is 20 seconds and 61-70 years is 17 seconds. While the response rate of the pictograms between the age category 20-30 years is 4 seconds, 31-40 years is 3.5 seconds, 41-50 years is 7.5 seconds, 51-60 years is 11 seconds and 61-70 years is 14 seconds. Thus, the study confines that the response rate of the pictograms is faster compared to the text.

From the 600 respondents, the collected data was arranged, and Cross Tabulation was performed. The Cross Tabulation of significant effect in the area (rural & urban) and the understanding of the pictogram was calculated. In the cross-tabulation, we have taken the data (understand, do not understand) from rural and urban hospitals and other environments. To prove the hypothesis (H_0 and H_1) and find out the significant effect, we have applied the Chi-Square test to the cross-tabulation.

The null hypothesis (H_0)- There is no association between the area (rural-urban) and the role and effectiveness of understanding the meaning and messages of the pictograms used inside the hospital for communication.

Hypothesis 1 (H_1)- There is a strong association between the area (rural-urban) and the role and effectiveness of understanding the meaning and messages of the pictograms used inside the hospital for communication.

For testing the hypothesis, a Chi-Square statistical test is applied to Statistical Package for the Social Sciences (SPSS) version 26 and the following result are obtained.

Rural & Urban * Opinion of respondent count Crosstabulation					
		opinion of respondent		Total	
		understand	do not understand		
rural & urban	Rural	Count	195 _a	105 _b	300
		Expected Count	219.5	80.5	300.0
	Urban	Count	244 _a	56 _b	300
		Expected Count	219.5	80.5	300.0
Total		Count	439	161	600
		Expected Count	439.0	161.0	600.0

Each subscript letter denotes a subset of the opinion of respondent categories whose column proportions do not differ significantly from each other at the .05 level.

Table 6: Table 6 shows the tabulate total counts of the rural and urban respondents and other environments.

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.382 ^a	1	.000		

Continuity Correction ^b	19.559	1	.000		
Likelihood Ratio	20.633	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.348	1	.000		
N of Valid Cases	600				
a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 80.50.					
b. Computed only for a 2x2 table					

Table 7: Table 7 shows the Chi-Square test value of the total number of respondents from both rural and urban hospitals and other environments.

From the above Chi-Square test, the null hypothesis is rejected because the p-value of the total calculated value is 0.000 which is less than 0.05, the level of frequency. Thus, it is proved that hypothesis 1 (H_1) is valid and the null hypothesis (H_0) is rejected. Hence, we can conclude that there is a strong association between the area (rural-urban) and the role and effectiveness of understanding the meaning and messages of the pictograms used inside the hospital for communication. It is evident from the data that the use of pictograms inside the hospital is a tool for communication and not a barrier in both rural and urban hospitals. Though there is a gap between textual communication and the public, infographic pictograms can easily minimize the gap to an extent.

Limitations:

During the survey, we found out that many rural hospitals like CHCs & Subcentre do not use any pictograms for communication inside the hospitals. The reason is that the hospitals are small and limited, and they do not have major facilities like the CHCs or the urban hospitals. So, many rural people are not much used to pictograms and when they visit urban hospitals, the people with lesser education find it difficult to read or understand the pictograms used for communication. Moreover, a few respondents were unaware of the various medical terms that the pictogram symbolizes. So, there will be always a difference and misunderstanding of the meaning of the pictograms used due to various cultural backgrounds which are inevitable. The language barrier also plays a major role in the hospitals because not all hospitals use 100% pictograms, some department facilities are indicated with text in both rural and urban hospitals. Many people were unable to read the English or Hindi text that was used in the pictogram and text boards because of their educational backgrounds and other circumstances.

Conclusion and Discussion

Pictograms can serve as communication tools to enhance the visual attention and comprehension of the visitors in a hospital. The pictograms inside the hospital can be used to direct visitors to the respective departments directly, making the communication system very easy. Most of the respondents were able to understand the meaning and the messages of the pictograms used and it becomes easier for them to find the respective departments in the hospitals. In both rural and urban hospitals and other environments, most of the respondents find the pictogram easy and readable since they are familiar with the symbols. Few could not read the pictograms because they were new to them or not familiar with the designs. In a few of the rural hospitals such as PHCs and CHCs, there are counted departments that are represented with text boards instead of pictograms. In some cases, with the respondents, there may be several factors that can affect the understanding of the pictograms for the audience such as the transmission of multiple types of information, if the pictogram is not well designed. It is recommended that a basic knowledge of this pictogram used in the hospital should be made familiar during high school education so that awareness is created at an early age and increases liability. Everyone visits the hospitals when it is necessary, so it is recommended that information must be popularized for better communication and understanding of the message of the pictograms used in the hospitals and participation in the decision-making process.

References

- Deana McDonagh, Nan Goggin, Joseph Squier, (2005), "Signs, symbols, and subjectivity: An alternative view of the visual", *Computers and Composition* 22 (2005) 79–86, Elsevier, DOI: 10.1016/j.compcom.2004.12.009
- Izadora M.C.Barros et al (2013), "The use of pictograms in the health care: A literature review", <https://doi.org/10.1016/j.sapharm.2013.11.002>
- Lynn Nielsen-Bohlman, Allison M. Panzer, David A. Kindig (2004), "Health Literacy: A Prescription to End Confusion" Washington (DC): National Academies Press (US); 2004.PMID: 25009856 Bookshelf ID: NBK216032 DOI: 10.17226/10883
- Norman, D.A. (1990), "The design of everyday things". New York: Doubleday, 1990. Stock, J. R., and Lambert, D. M. *Strategic Logistics Management* (4th Edition), McGraw-Hill, 2001

Rituraj Taye, Dr. Archana (2019) Usage of Infographics in Mobile Business in Promoting & Branding Healthcare in Social Media, IJRAR May 2019, Volume 6, Issue 2 (E-ISSN 2348-1269, P- ISSN 2349-5138)

Rituraj Taye, Archana, Ahammed Junaid, and Desh Deepak Singh (2022), "A Qualitative Evaluation of Infographics and Its Uses in Healthcare Communication" *Ulster Med J.* 2022 Jan; 91(1): 59–60. PMC8835413

Weihua Huang and Chew Lim Tan (2007), "A System for Understanding Imaged Infographics and Its Applications". *DocEng'07*, August 28–31, 2007, Winnipeg, Manitoba, Canada. ACM 978-1-59593-776-6/07/0008