E ISBN: 978-967-14569-5-8 (Publication Date: 28 October 2021)
UiTM Cawangan N. Sembilan, Kampus Seremban

A HANDBOOK OF ENVIRONMENTAL QUALITY INDEX

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ABSTRACT

Environmental Quality Index (EQI) represents four domains of the environment: air, water, noise and light. This index is significant in translating a wide variety of environmental indicators into a simple system that can easily be communicated. Based on a survey carried out to 50 students of EVA631 with regards to their learning difficulties, it was found out that, one of the major problems on their learning is difficulties to access to various environmental indexes during classes. Furthermore, to date, there is an absence of a handbook that compiles the index of all the quality domains. Therefore, this handbook aims to provide an easy quick reference to the students in referring to various EQI. In order to better understand students' perceptions towards this handbook, a survey was carried out towards 50 students of EVA631 and the findings reveal that, overall, students were satisfied with the content of the handbook. With this innovative idea, it is hoped that students will be able to be more focused on their learning especially in the era of the Covid-19 pandemic.

Keywords: handbook, environmental, quality, index

1. INTRODUCTION

The use of teaching and learning materials (T&L) can make a teaching process and learning becomes more effective to students. According to Ahmad Zanzali, N.A & Daud, N.D (2010), variations in teaching aids are important aspects to attract students and enhance their understanding during the teaching and learning process. A handbook or a reference book is seen as one of the conventional methods of reference however the positive impact gain from the usage of a handbook is undeniable. This handbook of Environmental Quality Index is intended to assist the students of EVA 631 and ADS667. EVA 631: Environmental Health and Security and ADS667: Practical training is two compulsory courses that must be taken by all students of Degree in Environmental Administration, University Technology MARA.

2. PROBLEM STATEMENT

A survey was carried out on 50 students of EVA631. This survey intended to understand the problems faced by the students that hinder their learning process in class. The findings from the survey reveal that the major problem students faced in class are difficulties to access to various environmental index (Table 1.1). Students need to browse through different websites of the Department of Environment (DOE) and Department of Occupational Safety and Health (DOSH) each time they need relevant information pertaining to the issues of environmental quality. With this amount of feedback from the students, this handbook was then developed.

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Table 1.1. Student learning problem in class

	Items	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)	Mean Score
1	Does EVA631 subject need some form of practical training outside of class?	40	4	6	0	0	4.68
2	Do you face difficulties in accessing to any environmental index?	**48**	**2**	**0**	**0**	**0**	**4.96**
3	Do you need fieldwork assignments to better understand the subject of EVA631?	45	3	2	0	0	4.86
4	Do you find difficulties to find EVA631 reference materials in the market?	44	4	2	0	0	4.84
5	Do you find it difficult to understand the syllabus of EVA631?	42	4	4	0	0	4.76

3. LITERATURE REVIEW

Basically, the content of this book mainly focused on Environmental Quality Standard (EQS). Environmental Quality Standard (EQS) is a concept for which there is no uniform definition in the legislative systems around the world. The term EQS is mostly used in Europe, while in the United States and Canada the terms Ambient Water Quality Criteria and Water Quality Guidelines, respectively, are used. In any case, when set in legislation, they are legally binding limits and are translated into concentrations of individual substances. EQS is an environmental medium quality standard for specific substances, which sets concentration thresholds below which, no adverse impact on the medium occurs, and which takes explicit account of available dilution at different discharge locations (P. Whitehouse 2001).

Air quality index (USEPA, 2006, 2009), was developed with the aim of providing people with a forecasting tool, informing them about air quality and its impact on human health, as well as the way they can protect their health. For this purpose, five major air pollutants (CO, SO2, PM10, O3, and NO2) were selected, their concentrations were classified into 6 different categories according to concentration breakpoints, and expressions describing the air quality were assigned to each category. For more detailed information about the EPA air quality index, you are referred to (USEPA, 2009).

Initially, WQI was developed by Horton (1965) in the United States by selecting 10 most commonly used water quality variables like dissolved oxygen (DO), pH, coliforms, specific conductance, alkalinity and chloride, etc. and has been widely applied and accepted in European, African and Asian countries. The assigned weight reflected the significance of a parameter for a particular use and has a considerable impact on the index. Furthermore, a new WQI similar to Horton's index has also been developed by the group of Brown in 1970, which was based on weights to an individual parameter. Recently, many modifications have been considered for the WQI concept by various scientists and experts.

Noise level is the fundamental measure used subsequently to construct scales and indices. The objective is to obtain a physical measure of sound level that correlates well with the subjectively assessed noisiness of the sound. Experience has shown that the measure should emulate the variation of sensitivity with the frequency of the human hearing system. Clearly, for most noise sources, the level will vary with time although in defining a noise level, time is not included in the description. The 'A' weighted level is the most commonly quoted noise level used in environmental acoustics. Noise levels measured using 'A' weighting are normally expressed as L dB(A) or more commonly these days as LA dB. Noise scales combine noise level with time in some way. This may be the level exceeded for a

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given proportion of time, as in LA10 dB, or it might be an integration of level with respect to time, as in LAeq dB. Other forms have also been quoted in the literature but are less commonly used in a transport context. Noise indices or ratings are created to provide an evaluation of noise in particular circumstances. Most commonly, indices are formed from the noise scales by merely defining the time period over which the scale applies. For example, the LA10,18h dB index refers to the specific time of day over which the noise scale should be averaged. A similar index in common use is the LAeq,24h dB which integrates the values of LAeq over a complete day (P G Abbott and P M Nelson 2002).

Light is an important external cue for adjusting humans' circadian rhythm or internal clock: this is known as Non-Image-Forming (NIF) effects of light J. A. Veitch (2002). People nowadays spend more than 90% of their life in an indoor environment. In this situation, the light-induced circadian rhythm entrainment differs considerably from the natural stimulation, especially for people working far away from building facades or during nighttime. Lack of proper entrainment of circadian rhythm due to insufficient light stimulation is responsible for serious health issues, like sleep deprivation and depression; it reduces productivity and alertness, an undesirable socio-economic burden for the country. Proper assessment of the light flux received by the eyes of building occupants is an important step toward characterizing and mitigating this issue. It was shown, under controlled conditions (K. Kaida et al. 2006), that 30 minutes of exposure to bright daylight near windows (with a pupillary illuminance ranging from 1000 to 4000 lux) was almost as effective as a short nap in reducing normal post lunchtime drowsiness in healthy subjects. Several authors contributed to determining the sensitivity threshold of the circadian system: they demonstrated that the human circadian pacemaker phase shifts are responding to relatively low illuminance levels for a broadband spectrum white light source (~100 lux at the cornea or 300-500 lux on the horizontal plane). Later on, it was shown that a pupilar illuminance ranging from 50 to 100 lux can affect the circadian system of humans in laboratory settings (IES 2016).

4. MATERIALS AND METHODS

According to Sabitha Marican (2006), survey questionnaires that have reliability of greater than 0.7 can be used as a measurement item in a study. The analysis was performed using Cronbach's Alpha from the Statistical Package for the social science (SPSS) software. A survey was conducted on 50 students of EVA 631. This survey is conducted in order to capture the first-hand perception towards this book after 3 months of usage. Likert scale format was used in the questionnaire 1 up to 5 (1 = strongly disagree and 5 = strongly agree). The list of items are as follows (Table 1.2):

Table 1.2. List of questionnaire items

Item Number	Questions
1.	This book contains the aspects of knowledge I need
2.	The facts in this book are accurate
3.	The language used is easy to understand
4.	The front page of the book is interesting and creative
5.	The organization of this book is clear and systematic
6.	Text integration and graphic used in this book is appropriate in conveying information
7.	I am satisfied with the book

5. RESULTS AND DISCUSSION

In general, students have a positive perception towards the content of the book with a mean of 4.54 (Table 1.3). However, 3 respondents have neutral feelings on the content of the handbook. The majority of the students also strongly agree that the facts in this book are accurate with a mean score of 4.92. Moreover, students also agree that the use of language is easy to understand with a mean score of 4.38. Students also agreed that the front page of the book is interesting and creative with a mean score of

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4.64. However, 4 respondents have neutral feelings on this. In terms of the organization of the book, students agreed that the organization of this book is clear and systematic. Students also agreed that text integration and the use of graphics in this book is appropriate with a min score of 4.92. Overall, a mean score of 4.96 was observed on the overall satisfaction towards the book.

Table 1.3. Findings of Mean Score

	Items	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)	Mean Score
1.	This book contains the aspects of knowledge I need.	43	3	4	0	0	4.54
2.	The facts in this book are accurate.	47	2	1	0	0	4.92
3.	The language used is easy to understand.	43	7	0	0	0	4.38
4.	The front page of the book is interesting and creative.	36	10	4	0	0	4.64
5.	The organization of this book is clear and systematic.	48	2	0	0	0	4.96
6.	Text integration and graphic used in this book is appropriate in conveying information.	46	4	0	0	0	4.92
7.	I am satisfied with the book.	48	2	0	0	0	4.96

6. CONTRIBUTION AND USEFULNESS/COMMERCIALISATION

This handbook is intended to assist the students of EVA 631: Environmental Health and Security subject and students of Practical Training ADS667 This handbook is useful to the students as a quick and easy reference. Previously, students need to browse through different websites of the Department of Environment (DOE) and Department of Occupational Safety and Health (DOSH) each time they need relevant information pertaining to the issues of environmental quality. This handbook is therefore appropriate in supporting students' learning and education development. Nevertheless, lecturers could also use this handbook as one of the teachings and learning strategies.

This handbook is prepared in two versions which are the physical handbook and QR Code. The physical handbook is significant for easier concentration and information retention while QR Code could provide students with easy access to the handbook.

Furthermore, this handbook also is equipped with some infographics relevant to the context of the course. This infographic could further assist the students to better understand the Environmental Quality Index. Figure 2 displays a sample of the infographic.

7. NOVELTY

This product of innovation uses creative graphic materials to help the students and educators facilitate their teaching and learning. Since the market only use Environmental Quality Index (EQI) by the Department of Occupational Safety and Health (DOSH) and the Department of Environment (DOE) website, this handbook will be able to create more interactive learning in class. As part of Sustainable Development Goals (SDGs), this product supports environmentally friendly by going paperless that is by using QR Code. Since the education system is now focusing on online learning due to the impact of the Covid-19, this handbook arrives just in time to create an accessible and sustainable learning process

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8. CONCLUSION

Handbook of Environmental Quality Index (EQI) provides a good opportunity for its focus group. This book aims to reduce students' difficulties in learning particularly on Environmental Administration subject. With huge information overload which involves tonnes of facts and data, this handbook possesses a great potential to assist educators and learners in their learning process.

ACKNOWLEDGEMENTS

The authors thank and appreciate all the participants in this study.

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