Research Report

Empowering Rural Youth for Socioeconomic Development: A Skill Development Approach in Sarawak, Malaysia

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Abstract

This study investigated how skills development training can empower rural youth to improve their socioeconomic status. An online questionnaire (n = 41) and semistructured interviews (n = 10) were conducted with graduates who joined a six-month information and communication technology (ICT) training program in Sarawak, Malaysia. The online survey discovered that the trained youth were likely to use the Internet to participate in socioeconomic activities such as information searching, communication, and e-commerce. Additionally, those who used computers and the Internet frequently were found more likely to be engaged in higher-paying occupations and industries than non-users ($p < 0.05$). The interviews revealed that the trained youth were empowered with knowledge and skills to move into the labor market and to provide ICT-related services to their communities. The overall findings suggest that skills development training helps facilitate the adoption and use of technologies by rural youth and improves their ability to serve their rural communities.

Keywords: rural areas, skills development, socioeconomic status, technology adoption, training

1. Introduction

The information and communication technology (ICT) industry is an important contributor to economic growth in Malaysia. In 2015 the ICT industry contributed to 17.8% (RM 206.1 billion; US$49.8 billion) of the national gross domestic product (GDP), compared to 17.0% (RM 188.4 billion; US$45.6 billion) in 2014. GDP growth came mainly from the expansion in telecommunication services and a nationwide increase in Internet penetration rate (DOSM, 2017). Despite the growth of the ICT industry, Sarawak, as the largest state in Malaysia, faces unique challenges in developing its ICT infrastructure in rural areas. Sarawak's rural population is distributed throughout more than 6,000 small villages, many of which are located in rugged terrain and not well connected by roads or electricity (Sarawak Energy, 2016). Chen (2016) reported that up to 30% of Sarawak's rural villages (which encompass about 40,000 households) still lack 24-hour electricity. Another report noted that the lack of basic infrastructures inhibits the adoption of e-government services by the rural population (Star Online, 2016). Apart from that the rural population is composed mainly of indigenous Dayak, particularly the Iban and Bidayuh communities. Based on two recent studies, teachers and students in Iban communities had low levels of ICT knowledge, skills, and awareness to incorporate technologies into their learning and teaching approaches (Pusso & Ahmad, 2016; Sambau & Rahman, 2016). Similar findings were reported by Songan, Hamid, Yeo, Gnaniah, and Zen (2004) and Gnaniah, Yeo, Zen, Songan, and Hamid (2005) that the

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low level of ICT use in two remote areas of Sarawak, Bario and Long Bedian, was due to the lack of basic infrastructure for ICT implementation and low levels of ICT skills and awareness among the rural residents. The findings above indicate there are disparities in access to and use of ICTs between Sarawak's rural and urban areas, the so-called "digital divide."

There are many definitions of the digital divide in the literature. In general, *digital divide* is defined as "the gap between those who do and those who do not have access to computers and the Internet" (van Dijk, 2005, p. 1). Bryen and Moolman (2015) describe digital divide as "the gap between those with regular, effective access and ability to use digital technologies and those without" (p. 1456). Nam and Park (2017) used this definition: "a gap between a group that can access new technology and one that cannot, and a division between those who have information skills and those who don't" (p. 258). The term was further expanded to include "individuals, households, businesses and geographical areas at different socioeconomic levels with regard to both their opportunities to access ICTs and to their use of Internet for a variety of activities" (Vickery & OECD, 2002, p. 187). For the purpose of this study, digital divide refers to the gap between individuals who have access to and the ability to use digital technologies and those without for achieving socioeconomic development of rural communities. The United States Department of Commerce reported that "individuals' economic and social wellbeing increasingly depends on their ability to access, accumulate, and assimilate information" (NTIA, 1995, pp. 7–8). The statement emphasizes the importance of closing the digital divide to drive socioeconomic development of rural communities. To bridge the digital divide, several ICTs for development (ICTD) initiatives have been established by the Malaysian government. Some examples of the initiatives are described next.

Most ICTD initiatives focus on developing ICT infrastructure in rural areas and providing access to ICT facilities and services for underserved groups. A prime example is the Universal Service Provision (USP) program initiated by the Malaysian Communications and Multimedia Commission (MCMC). Under the program, 92 telecenters, called Pusat Internet 1Malaysia (PI1M), were established in Sarawak by the end of 2015. The telecenters serve as a place for the public to gain Internet access, secretarial services, and ICT training services. Rural broadband is another initiative established under the USP program. Through the initiative, 448 ports were installed in Sarawak by the end of 2015 to provide broadband service with speeds up to 4 Mbps to underserved rural areas (MCMC, 2017). Similar to PI1M, the Medan InfoDesa (MID) program and the e-Bario project focus on setting up telecenters or community access centers in rural areas. The MID program was initiated by the Ministry of Rural and Regional Development in 2001 (KKLW, 2015). By 2011 seven telecenters had been established through the MID program to provide ICT training and related services such as Internet access, e-government services, and computer repair to the rural communities. The e-Bario project was initiated by University Malaysia Sarawak in 1998 to improve the access to and use of ICTs by the isolated Kelabit community living around the Bario highlands in northern Sarawak (Yeo, Hazis, Zaman, Songan, & Ab Hamid, 2011). Throughout the project, the Kelabit community was equipped with a community telecenter, public telephones, and Internet-linked computers in both primary and secondary schools. The examples above show that telecenters are established to provide ICT-related services and training to the rural population, while the provision of Internet services promotes the uptake and use of technologies in their daily lives.

The Rural ICT Guided Home-based Technopreneur (RIGHT) program is a six-month ICT training program initiated by Sarawak Information Systems Sdn Bhd (SAINS) in 2006 (SAINS, 2016). The program has five phases: candidate recruitment, six-month training, graduation, career choice, serve local communities. The program aims to equip rural youth from different districts of Sarawak with necessary knowledge and skills in ICTs, to be employed or to become ICT service providers in their communities. The trained rural youths are expected to use the knowledge and skills they acquire from the program in their daily lives and ultimately improve their socioeconomic status. A description of the five phases can be found on the RIGHT program website at http://www.rightsarawak.com/.

The objectives of this article are to measure ICT access and use by the RIGHT graduates and to investigate the effects of ICT use on their socioeconomic status. An online survey was conducted among program graduates between 2006 and 2016, whereas semistructured interviews were conducted with the 2016 graduates. The survey results were compared with similar findings from three recently published national surveys

(DOSM, 2014, 2016a, 2016b) to determine the levels of ICT access and use and the graduates' socioeconomic status. The three research questions addressed are:

1. What are the levels of ICT access and use among the RIGHT graduates?
2. What are the socioeconomic impacts of skills development training on the RIGHT graduates?
3. What are the effects of ICT use on the socioeconomic status of the RIGHT graduates?

The first question was used to identify the levels of ICT access and use among the graduates and their computer and Internet skills to participate in socioeconomic activities such as e-commerce and information searching. The second and the third questions seek to understand how likely the graduates were to apply the knowledge and skills they acquired from the RIGHT training to engage in work activities and to participate in closing the digital divide in rural communities through the establishment of telecenters and the provision of training courses and ICT-related services.

The rest of this article is organized as follows: Section 2 introduces a conceptual model developed to achieve the study's objectives. Section 3 presents the methods used for data collection and data analysis. The results of the study are presented and discussed in Sections 4 and 5, respectively. Section 6 summarizes the findings of this study, followed by study limitations in Section 7.

2. Conceptual Model

A conceptual model, composed of ICT and socioeconomic status (SES) indicators, was developed based on the findings from published national surveys and relevant literature.

The International Telecommunication Union (ITU), an agency of the UN, developed a core list of ICT indicators for policy makers and researchers to measure ICT access and use by households and individuals. Up to 10 of the ITU's ICT indicators were used repeatedly in two national surveys conducted by the DOSM in 2013 and 2015 (DOSM, 2014, 2016a).

Comparing data from the two surveys revealed that:

- The percentages of Internet users, computer users, and mobile phone users in 2015 have increased, respectively, by 14.1%, 12.7%, and 3.3% to 71.1%, 68.7%, and 97.5%.
- The percentages of households with access to the Internet, computers, and mobile phones were 70.1%, 67.6%, and 97.9%, respectively, in 2015, compared to 58.6%, 59.4%, and 97.0% in 2013.
- The primary location for accessing the Internet was at home, increased from 71.2% in 2013 to 75.0% in 2015.
- The main types of activities performed by computer users in 2015 were: using copy and paste tools to edit documents (77.2%), copying or moving a file or folder (74.8%), and sending emails with attached files (55.4%).
- The main types of activities performed by Internet users in 2015 were: participating in social networks (84.3%), getting information about goods and services (79.6%) and getting involved in leisure activities such as downloading movies and playing games (76.1%).

The surveys provide an overview of the levels of ICT access and use by the general Malaysian population. To address the first research question (What are the levels of ICT access and use among the RIGHT graduates?), a questionnaire encompassing the ITU's 10 ICT indicators was used to measure household access and individual use of ICTs among the RIGHT graduates. The questionnaire was adopted from *Manual for Measuring ICT Access and Use by Households and Individuals, 2014 edition* (ITU, 2014).

The RIGHT program focuses on imparting ICT knowledge and skills to its candidates, which in turn allows them to adopt and use ICT products and services effectively in their daily lives and at work. In other words, the program provides a platform for rural youth to enhance their employability skills and entrepreneurship competencies through skills development training. A study by Mariscal, Gutierrez, and Junqueira Botelho (2009) reported that adoption of professional skills through ICT training contributes to the ability of marginalized youth to look for and secure employment. Another study by Walton, Putnam, Johnson, and Kolko (2009)

found that basic computer literacy such as using Microsoft Office products and emailing are associated with higher-paying employment and higher incomes in developing countries. Based on these previous studies, the second research question (What are the socioeconomic impacts of skills development training on the RIGHT graduates?) was addressed by conducting semistructured interviews with the graduates. Several topics were discussed during the interviews to understand how skills development training can help the graduates improve their socioeconomic condition and community participation. The topics included their experience with the six-month ICT training, their personal and professional growth, and their participation in serving their community members after program completion.

Four indicators were used to demonstrate the graduates' SES (Figure 1). The graduates' employment status, monthly income, occupation, and participation in the ICT industry were identified through an online questionnaire. To address the third research question, the findings of a national salaries and wages survey (DOSM, 2016b) were used as standards to evaluate the effects of ICT use on their SES. The national survey was conducted in 2015 to identify the median and mean monthly earnings of paid employees in both public and private sectors in Malaysia.

The key findings of the survey include:

- The median and mean earnings were RM 1,600 (US$387) and RM 2,312 (US$559), respectively.
- The medians for males and females were the same (RM 1,600; US$387), whereas the mean for males (RM 2,345; US$567) was higher than that for females (RM 2,254; US$545).
- The median and mean earnings increased with age for employees aged 15–59. Employees with tertiary education received the highest median (RM 3,100; US$750) and mean (RM 3,854; US$930), followed by secondary-educated and primary-educated employees.
- The median for employees in urban areas (RM 1,855; US$448) was higher than that in rural areas (RM 1,200; US$290).
- The category of "managers" received the highest median (RM 5,300; US$1,282) and mean (RM 6,613; US$1,600), whereas the category of "elementary occupations" recorded the lowest median (RM 1,000; US$242) and mean (RM 1,191; US$288).
- Employees in the "mining and quarrying" industry received the highest median (RM 3,600; US$870) and mean (RM 4,297; US$1,040), whereas those in the "agriculture, forestry and fishing" industry received the lowest median (RM 1,050; US$254) and mean (RM 1,232; US$298).

The survey indicates that a high income is related to a high level of education and a high-skilled occupation. The survey also provides monthly earnings for different sociodemographic groups at the national level in Malaysia. Based on these results the graduates were classified by their highest education level attained, occupation, industry, gender, and age. The monthly earnings of the different groups were compared with those reported in the national survey. In addition, significant tests were used to investigate the relationships between the use of different ICT devices and the SESs of the different sociodemographic groups.

3. Methods

3.1. Data Collection

This study used a mixed-methods approach comprising three phases. In phase one, an online questionnaire composed of demographic questions, ICT indicators, and SES indicators was conducted among the RIGHT graduates. The survey was distributed to 87 graduates on October 1, 2016. Forty-one responses were received by the end of November 2016, for a response rate of 47.13%. Phase two involved the collection of face-to-face, semistructured interviews with 10 youth who graduated in 2016. The interviews were conducted October 4–25, 2017 to collect information regarding how the training program empowered the graduates to go after socioeconomic benefits such as employment, entrepreneurship, and community involvement. The participants were selected based on their availability to join the interviews during the team's site visits to seven rural villages in three districts (Bau, Lundu and Kuching) of Sarawak. Each interview took less than 30 minutes

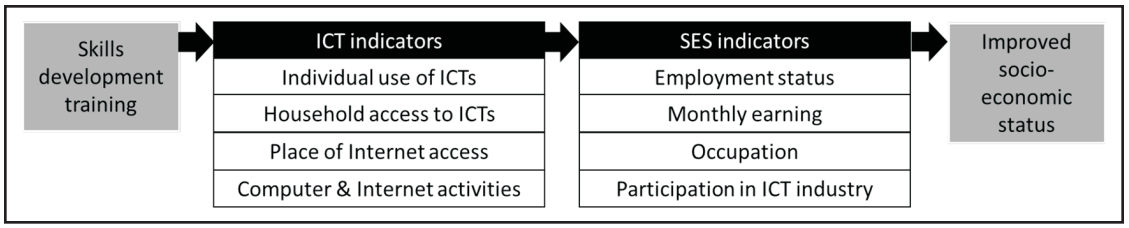

Figure 1. The conceptual model.

and was audiorecorded by the interviewer. In the last phase a manual search of published national survey datasets was performed. Three datasets were retrieved from the Department of Statistics Malaysia. Two of the datasets contain information about ICT access and use by households and individuals in all states of Malaysia in 2013 and 2015 (DOSM, 2014, 2016a); another dataset provides the medians of monthly earnings of employees in both public and private sectors at the individual level (DOSM, 2016b).

3.2. Data Analysis

The responses to 20 items in the online questionnaire were found comparable to those reported in the national surveys. The responses to the 20 items were extracted from the datasets, compiled, and analyzed using SPSS 22.0. Several analytical methods were used. Percentage charts were created to compare the differences in ICT use and adoption between the RIGHT graduates and the general public in Malaysia and rural areas in Sarawak. Descriptive statistics including frequency (*F*) and percentages (%) were used to describe the graduates' sociodemographic characteristics, and trend lines were created to compare the graduates' monthly salaries with those reported in the national survey. Lastly, the occupations and industries that the graduates engaged in were classified, respectively, according to the Malaysia Standard Classification of Occupation (MOHR, 2008) and the Malaysia Standard Industrial Classification (DOSM, 2008). Based on the national salaries and wages survey, the median monthly earning of paid employees in Malaysia was RM 1,600 (US$387) in 2015 (DOSM, 2016b). The median was used as a threshold to classify the graduates into lower- and higher-income groups and lower- and higher-paying occupations and industries, as indicated in Table 1.

Odds ratios and Fisher's exact tests were used to analyze the effects of ICT use on the graduates' earning and employment status. On the other hand, each audiotaped interview was transcribed verbatim and translated from Bahasa Malaysia to English independently by the interviewer, this article's first author. The second author compared and validated the transcribed tape recordings. The names of the interviewees were replaced with code numbers to keep their identities anonymous, and the audio files and transcriptions were saved in password-protected files. The data collected were analyzed and coded to identify emerging themes.

4. Results

4.1. Quantitative Findings

Section 4.1.1 starts by describing the levels of ICT access, adoption, and use among the RIGHT graduates. The results were compared to the national rates reported in DOSM surveys. Section 4.1.2 presents the employment and earning status of the graduates, their participation in the labor force, and the factors affecting the earning capacity of the graduates. The effects of ICT use on the socioeconomic conditions of the graduates are described in Section 4.1.3.

4.1.1. ICT Access, Adoption, and Use

Household Access and Individual Use of ICTs

The columns in Figure 2 illustrate the levels of ICT access and use in rural Sarawak. A comparison of the DOSM surveys reveals that:

- The use of computers and the Internet increased, respectively, by 11.1% and 13.2%.
- Households with access to computers and the Internet increased, respectively, by 11.6% and 7.7%.

Table 1. Description of Variables.

Label	Description (Value)
Demographics	
Gender	= 1 for male, and = 2 for female
Age	= 1 for ages 15–29, and = 2 for ages 30–59
Education	= 1 for Malaysian Certificate of Education, or *Sijil Pelajaran Malaysia* (SPM), and = 2 for Malaysian Higher School Certificate, or *Sijil Tinggi Pelajaran Malaysia* (STPM), diploma and bachelor's
ICT indicators	
Individual use of a computer	= 1 for yes (identified as "computer users"), and = 0 for no
Individual use of a mobile phone	= 1 for yes (identified as "mobile phone users"), and = 0 for no
Individual use of the Internet	= 1 for yes (identified as "Internet users"), and = 0 for no
SES indicator	
Monthly earning	= 1 for RM 1,600 (identified as "lower-income group"), and = 2 for > RM 1,600 (identified as "higher-income group")
Occupation	= 1 for occupations with earnings below the threshold of RM 1,600 (identified as "lower-paying occupation"), and = 2 for occupations with earnings above the threshold (identified as "higher-paying occupation")
Industry	= 1 for industries with earnings below the threshold of RM 1,600 (identified as "lower-paying industry"), and = 2 for industries with earnings above the threshold (identified as "higher-paying industry")

In addition, mobile phones were the most commonly used ICT equipment. However, less than 10% of households owned fixed telephone lines, and the use of computers and the Internet in rural Sarawak remained less than 50% in 2015. An analysis of the online survey (RIGHT_2016) found:

- high percentages of mobiles phone users (100%), computer users (85.4%), and Internet users (90.2%);
- high percentages of households with access to mobile phones (100%) and computers (82.9%);
- about 46% of households without Internet access at home;
- only 26.8% of households owned fixed telephone lines. Both the national surveys and the online survey indicate that mobile phones were the most important communication device in rural areas and a low percentage of rural households had access to the Internet.

Place of Internet Access

As shown in Figure 3 about 71% of Sarawak's rural population used the Internet while traveling (via a portable device such as a smartphone or a tablet) and about 52% used the Internet at home. Similar results were obtained from the online survey, which found that 68.3% of the graduates used the Internet while traveling and 53.7% used the Internet at home. In addition, a higher percentage of graduates reported use of the Internet at their workplace (48.8%) when compared to the national rate of 33.8%. Furthermore, both the national and online surveys revealed low percentages (less than 20%) of graduates and rural residents who used the Internet at educational institutions, another person's home, or community or commercial Internet access facilities.

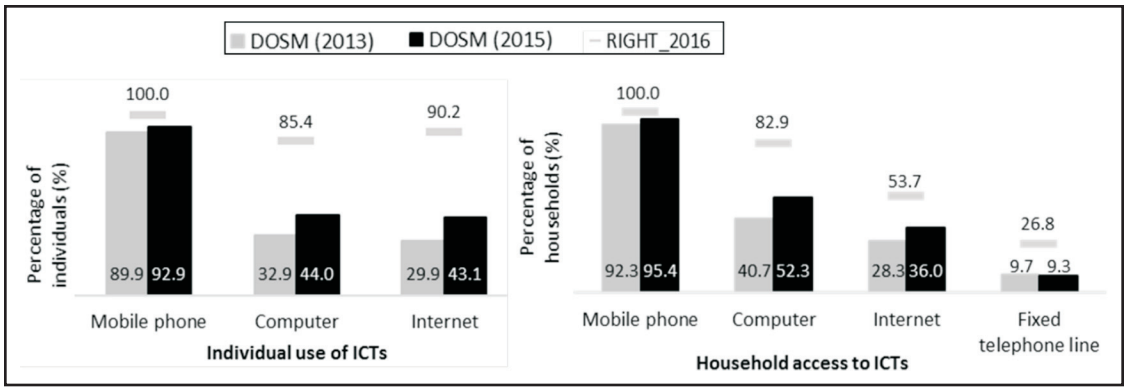

Figure 2. ICT use and access by individuals and households in rural Sarawak.

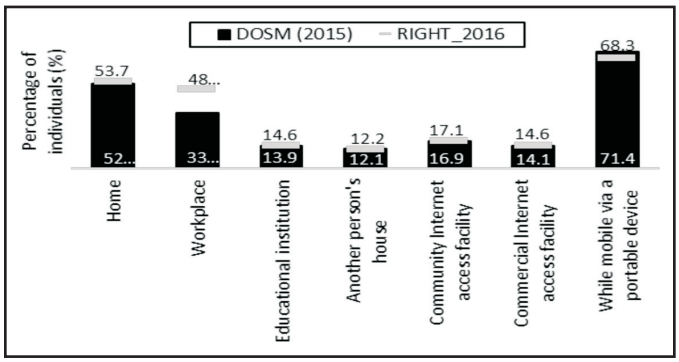

Figure 3. Place of Internet access by RIGHT graduates and rural Sarawak population.

Computer- and Internet-Related Activities

The computer- and Internet-related activities performed by the RIGHT graduates and the general Malaysian population are illustrated in Figures 4 and 5, respectively. The asterisk (*) in the figures indicates activities with no comparable data. As shown in Figure 4, computers were used commonly to perform tasks such as typing and printing documents (85.4%), duplicating and moving information within a document (78.0%), and copying or moving a file or folder (78.0%). About half the graduates used computers to perform data analysis in a spreadsheet (53.7%), create electronic presentations (56.1%), or search, download, install, or configure software (56.1%). Connecting and installing a new device was the least performed computer activity by the graduates (32.0%).

On the other hand, most graduates used the Internet to participate in social networks (80.5%), get information about goods or services (75.6%), or send or receive emails (75.5%), as indicated in Figure 5. Fewer than 25% of the graduates used the Internet to save files using online storage space (22.0%), edit data files using software run over the Internet (14.6%), or manage their personal homepage (9.8%) or add contents to a blog (2.4%). Compared to the national rates in 2015, a higher percentage of the graduates used the Internet to sell goods or services (51.2%), search information related to health, education, or government services (53.7%, 53.7%, and 51.2%, respectively), look for a job (68.3%), or make online phone calls (65.9%).

4.1.2. Socioeconomic Status

Employment and Earning Status

During the data collection phase, 31 graduates were employed or self-employed, five were unemployed, and five were outside the labor force (four students and one homemaker). The earning status of the graduates is shown in Figure 6. The figure shows that:

- 75.6% of the graduates were involved in the labor force as paid workers.
- 16.8% earned less than or equal to RM 1,000 (US$242).
- About 50% earned more than RM 1,000 (US$242).

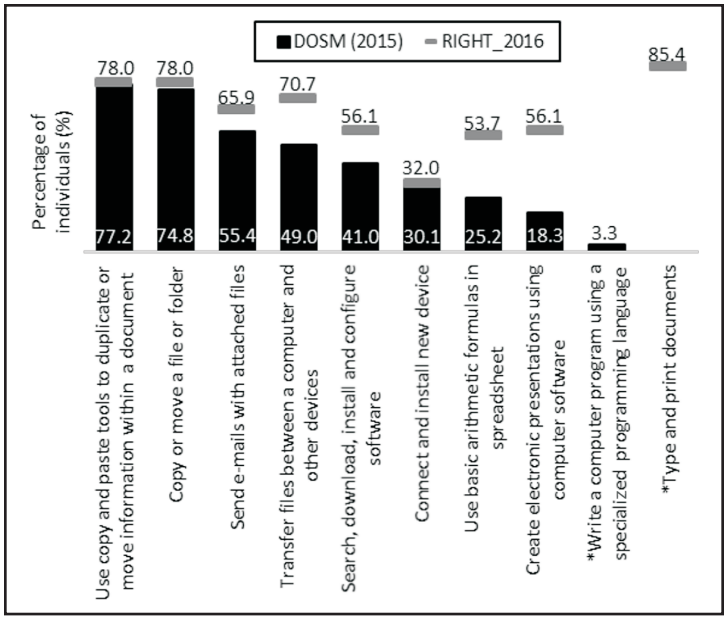

Figure 4. Computer-related activities performed by RIGHT graduates and general Malaysian population.

Compared to the national medians in 2015, about 65% of the employed graduates were receiving more than the median monthly earning in Sarawak (RM 1,260; US$305) and rural Malaysia (RM 1,200; US$290); however, up to 74% of them were earning less than the median in Malaysia (RM 1,600; US$387).

Occupations and Participation in the ICT Industry

The employed graduates were grouped by type of occupation and industry they were engaged in. The primary and secondary occupations (either full-time or part-time) of the employed graduates were investigated. Some of the employed graduates (10 of 31) have more than one occupation in different industries. As indicated in Figure 7, most graduates were classified as craft and related trades workers (61.3%) and clerical support workers (38.7%). Up to 20 graduates were engaged in skilled occupations, including IT support worker (16), building frame and related trades worker (2), vocational training officer (2), photographer (1), and dental assistant (1). In addition, 95.3% were employed in service industries, particularly in the sectors of information and communication (51.6%) and administrative and support services (41.9%).

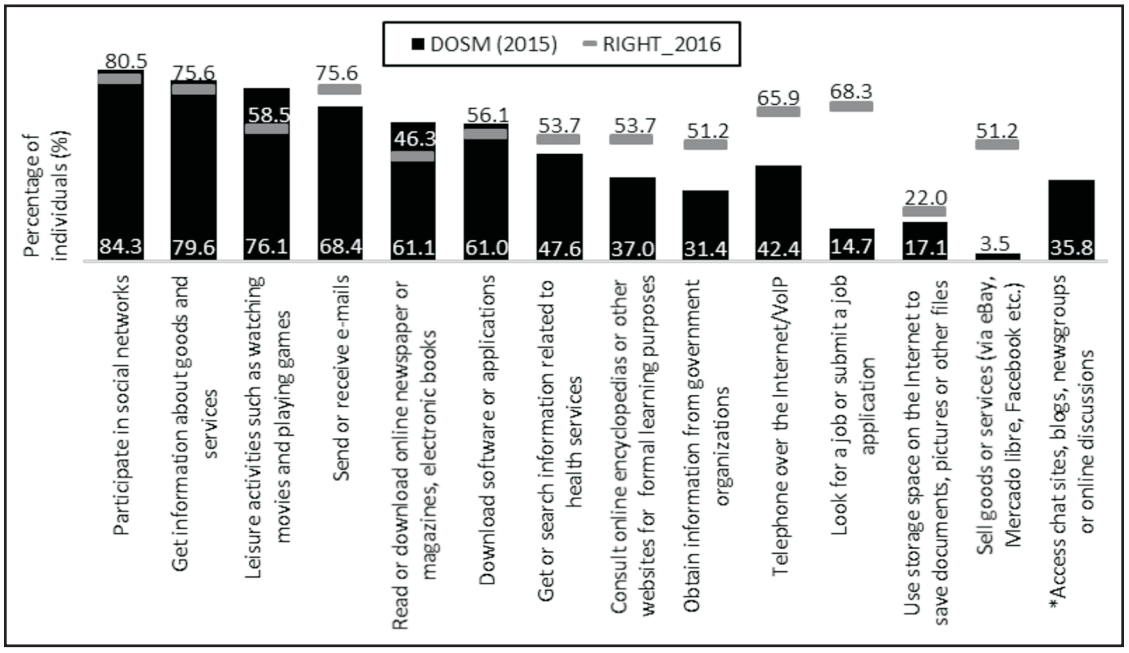

Figure 5. Internet-related activities performed by RIGHT graduates and general Malaysian population.

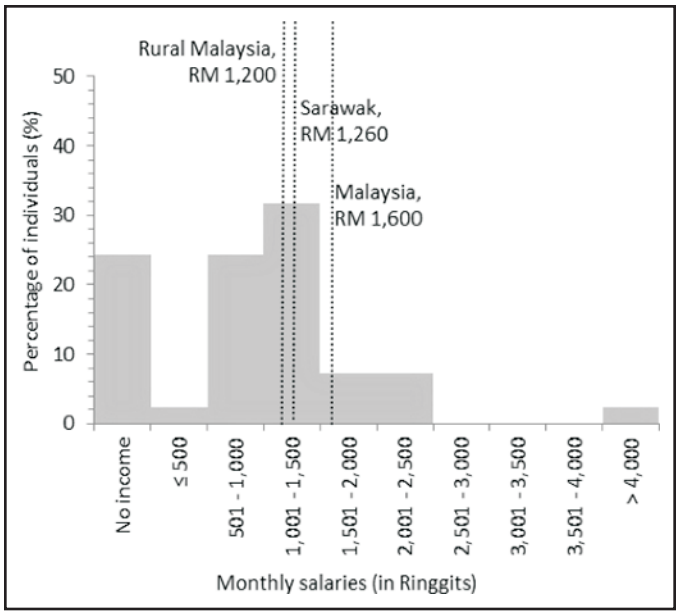

Figure 6. Monthly earnings of graduates.

Factors Affecting Earning Capacity

The graduates were classified by their sociodemographic characteristics, which included education level, age, gender, and type of occupation and industry. Most of the graduates were secondary school educated (SPM or STPM), aged 20–34, and worked in the service industry. The graduates' earning capacity was evaluated by comparing their monthly earnings with the median monthly earnings (thresholds) of paid employees reported in the national survey (DOSM, 2016b). As shown by the trend lines in Figure 7:

- About 16% of the graduates with SPM certificates were earning less than or equal to RM 1,000 (US$242), whereas another 45% were earning more than the threshold income of RM 1,400 (US$339).
- Graduates with higher education levels, including STPM, diploma, and degree, received monthly earnings less than the thresholds.
- About 45% of those aged 20–24 and 88% of those aged 30–34 received monthly earnings below the thresholds.
- Only about 56% of those aged 25–29 were earning close to the threshold of RM 1,500 (US$363).
- Only five females and two males received monthly earnings greater than the threshold of RM 1,600 (US$387).
- Most of the graduates employed as "technicians and associated professional," "clerical support workers," and "service and sales workers" were earning below the thresholds.
- Most of the graduates in the information and communication industry received monthly earnings between RM 500 (US$121) and RM 1,500 (US$363), which were much lower than the threshold of RM 3,100 (US$750).

The results suggest that the graduates' earning capacity did not increase with education level or age. No significant differences in monthly earnings were found between males and females, or between lower- and higher-paying occupations and industries ($p > 0.05$).

4.1.3. Effects of ICT Adoption and Use on Socioeconomic Status

Fisher's exact tests were performed according to the variables described in Table 1. The following statistical significant differences ($p > 0.05$) were found:

- Females were 2.8 times more likely than males, and computer users were 1.47 times more likely than noncomputer users, to be employed in higher-paying occupations (above the threshold of RM 1,600 or US$387).
- Internet users were 1.36 times more likely than non-Internet users to be employed in higher-paying industries (above the threshold of RM 1,600 or US$387).

No significant differences in monthly salaries and wages were found between the two education groups and between the two age groups ($p > 0.05$).

	Socio demographic characteristics	*F*	(%)	RIGHT_2016 ≤ RM 500	RM 501-1,000	RM 1,001-1,500	RM 1,501-2,000	RM 2,001-2,500	> RM 4,000	DOSM (2015) Median monthly salaries and wages (in Ringgits)
Education	SPM	19	(61.3)							1,400
	STPM	7	(22.6)							2,000
	Diploma	4	(12.9)							2,800
	Degree	1	(3.2)							4,350
Occupation	Technicians and associated professional	3	(9.7)							2,700
	Clerical support workers	12	(38.7)							1,900
	Service and sales workers	5	(16.1)							1,200
	Skilled agriculture, forestry and fishery workers	1	(3.2)							1,225
	Craft and related trades workers	19	(61.3)							1,400
	Elementary occupations	1	(3.2)							1,000
Industry	Agriculture, forestry and fishing	1	(3.2)							1,050
	Manufacturing	2	(6.5)							1,500
	Construction	1	(3.2)							1,440
	Services	29	(93.5)							2,000
	Wholesale and retail trade	1	(3.2)							1,350
	Transportation and storage	1	(3.2)							1,800
	Accommodation and food service activities	1	(3.2)							1,080
	Information and communication	16	(51.6)							3,100
	Administrative and support service activities	13	(41.9)							1,100
	Public administration and defense	1	(3.2)							2,800
	Education	3	(9.7)							3,990
	Human health and social activities	1	(3.2)							2,550
Age	20-24	11	(35.5)							1,200
	25-29	9	(29.0)							1,500
	30-34	9	(29.0)							1,945
	35-39	1	(3.2)							2,000
	40-44	1	(3.2)							2,125
Sex	Female	18	(58.1)							1,600
	Male	13	(41.9)							1,600

Figure 7. A comparison of monthly earnings of the employed graduates to the medians reported in a national survey.

4.2. Qualitative Findings

This section presents the responses of 10 graduates who participated in the semistructured interviews. The themes that emerged from the interviews are summarized in Figure 8 and illustrated with quotations from the interviews. The findings from the interviews indicate that after the six-month RIGHT training, rural youth improved their knowledge and skills in ICT, which in turn enabled them to improve their socioeconomic conditions and serve their own communities.

4.2.1. Improved Digital Literacy

Two questions were posed to understand the process by which the participants improved their knowledge and skills through the six-month RIGHT training.

The first question was: What are your experiences in using ICTs before you joined the training? Most of the graduates responded that they used computers and the Internet for basic computing tasks and entertainment activities before they joined the training, as exemplified in the following quotes:

> I know how to create documents using Microsoft Word. I also know how to use a computer to surf the Internet and play games. (Participant 1)

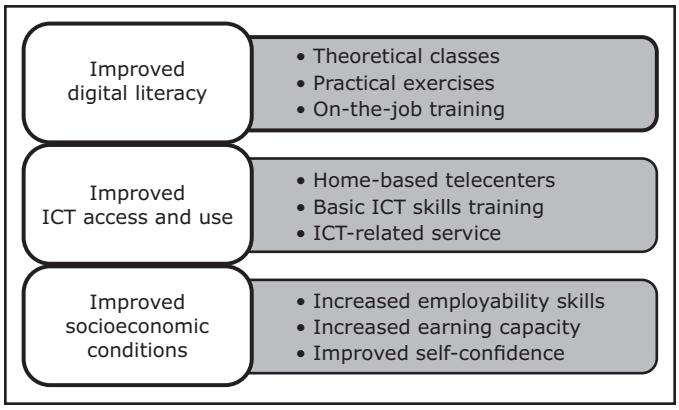

Figure 8. Digital and socioeconomic outcomes of the RIGHT program.

> I have some basic computer skills like Microsoft Word only. I used the Internet for social networking and watching online videos. (Participant 3)

Only two participants said they had experience in installing software and repairing hardware before they joined the training. As reported by one of them:

> I joined a basic computer skills course when I was in secondary school. I have some degree of knowledge in troubleshooting computer peripherals like scanner and printer and downloading and installing software. (Participant 2)

The second question was: What have you learned during the training? There was strong consensus among the participants that they had gained new ICT knowledge, skills, and experience. Three different teaching and learning scenarios were discovered from the responses. This is evidenced by the following quotes:

> I've learned a lot from the program. I improved my skills in using Microsoft Office applications. I learned how to develop a website. We were also trained to repair and troubleshoot computers during practical class. (Participant 4)

> I gained a lot of experience from working temporarily with SAINS (the program initiator) as technical support assistant for three weeks. I've learned a lot from the SAINS staff and gained various experience. (Participant 6)

> Through the program we were given the opportunities to improve our theoretical knowledge in IT. We learned about hardware, software, and some basic programming languages such as HTML from the trainer. (Participant 10)

The responses indicate that the program provided a platform for rural youth to improve their digital literacy through theoretical classes, practical exercises, and on-the-job training. After the training the RIGHT graduates were expected to use their newly acquired knowledge and skills to educate and serve their communities and to improve their socioeconomic condition, which are discussed, respectively, in sections 4.2.2 and 4.2.3.

4.2.2. Improved ICT Access and Use

Another three questions were posed to understand how the training program could contribute to bridging the digital divide in rural communities. The questions were: Do you have a home-based telecenter? What motivated you to open a telecenter in your village? Do you offer training courses and services related to ICTs to your community?

Three of the 10 participants currently operate home-based telecenters in their villages. They were primarily motivated to open them to provide easier access to computer skills training and Internet services for their communities. According to one participant:

> My telecenter is the only Internet access facility in my village. The villagers can use the Internet and study basic computing skills in my telecenter without having to enter the town.
> How far is the nearest town from your village by car?
> About an hour. (Participant 2)

Three participants also have experience in offering basic ICT skills training through their telecenters, as reflected in the following quotes:

I offer short courses on Microsoft Office applications.
Who are your customers?
They are mostly secondary school students in the village. (Participant 7)

I offer training courses in Microsoft Word and Excel only. (Participant 9)

Regardless of whether the participants have a telecenter, six of them indicated they have experience in providing ICT-related services such as IT consultation, purchasing air tickets, computer repair and troubleshooting, secretarial services (printing and scanning documents), and online bill-paying services for their community members. This is evidenced by the following quotes:

I provide online pay-bill services and help [to the villagers] to buy air tickets. I also provide services like printing invitation cards, wedding cards, and scanning documents. (Participant 7)

Sometimes, I try to help people in the village. For example, I recommend [to] them where to buy external keyboard with a cheaper price. I give them my opinion. (Participant 4)

I helped my relative to reformat his laptop last week. I also have experience in helping my neighbors to install software. (Participant 6)

The responses show that the participants improve access to and use of ICTs through the establishment of home-based telecenters and provision of ICT-related services in their communities. Besides, the practice of knowledge sharing via training courses has the potential to improve the digital literacy of the younger generation in rural communities.

4.2.3. Improved Socioeconomic Opportunities

Several topics were discussed during the interviews to understand the impacts of the program on the participants' personal and professional development. The topics included the use of ICT in daily life and at work, obtaining employment and earning status, and developing a career plan. Three common themes were identified from the responses of the graduates: improved employability skills, increased earning capacity, and improved self-confidence.

Improved Employability Skills

More than half the participants responded that they applied the skills they learned from the program in their workplace. These responses suggested the participants were equipped with employability skills, which enabled them to be hired and enhance their career development. This is evidenced by the quotes below:

The program helps enhance my career. For example, I worked as a technical support on last week. I used the skills that I learned from the program to fix computers and printers in a secondary school near to my village. (Participant 4)

I work as a clerical officer. The job requires skills in using Microsoft Office and Microsoft Excel. Before I joined the program, I was jobless and my computer skills were poor. The skills that I learned from the program has helped in getting my current job. (Participant 5)

Do you apply the skills that you learned from program at work?
Yes. I also work as a part-time ICT service provider. I help people in my village to troubleshoot their computers and buying air tickets. (Participant 6)

Increased Earning Capacity

Six of 10 participants have experience in providing ICT-related services and training courses to their community members. They indicated they earned extra income by providing those services, as indicated in the quotes below:

I earn about 500 to 1,000 ringgits per month by providing services and training to students in my village. (Participant 2)

How much did you earn every month from your ICT center?
About 500 ringgits.

How much do you charge for formatting a computer?
The price now is 70 ringgits. (Participant 7)

How much on average do you earn from providing those training courses?
Less than 1,000. Most of them are students. (Participant 9)

Improved Self-Confidence

More than half the participants indicated they are more confident in their work, communicating with their friends, and serving their communities after they joined the program. Some of the responses from the participants are given as follows:

The skills that I learned from the program improved my confidence at work. (Participant 3)

I improved my confidence to provide training courses and ICT services in my villages. (Participant 7)

Before joining the program, I have very poor skills in using the Internet and different software. The program gave me the confidence to communicate with my friends. (Participant 8)

The findings in this section suggest that the program equipped the participants with the knowledge and skills necessary to engage in work activities, to generate extra income, and to serve their rural communities. In other words, the program has the potential to improve the socioeconomic wellbeing of rural youth.

5. Discussion

A mixed-methods approach was used to address the three research questions. The first research question (What are the levels of ICT access and use among the RIGHT graduates?) investigated the levels of ICT access and use among the RIGHT graduates. Compared to the national rates, the online survey shows that the graduates were more likely to:

- have access to ICT equipment and services;
- use the Internet at work;
- have higher levels of computer proficiency and Internet skills;
- engage in computer- and Internet-related activities.

In addition, an analysis of the Internet activities carried out by the graduates revealed their participation in socioeconomic activities such as information searching (e.g., searching for or retrieving information related to health services), communication (e.g., participating in social networks and telephoning over the Internet), and e-commerce (e.g., selling goods or services via eBay). Another significant finding is that about half the graduates (51.2%) have experience in selling goods or services online, which is markedly higher than the percentage (3.5%) reported in the national survey (DOSM, 2016a). The finding indicates that graduates have adopted the Internet for commercial purposes. Furthermore, up to 68.3% of the graduates used the Internet to look for a job or submit a job application online, compared to 14.7% reported in the national survey (DOSM, 2016a), suggesting the graduates are proactive with their careers. Previous studies reported that most of the rural dwellers in Sarawak were unaware of the benefits of ICTs due to little education, poverty, and language barriers (Gnaniah et al., 2005; Pusso & Ahmad, 2016; Songan et al., 2004). Despite that, the findings of the online survey suggest that the youth who attended the RIGHT program were aware of the benefits of ICTs. A high percentage of them possessed basic computer and Internet literacy skills to participate in socioeconomic activities such as e-government and e-commerce services.

The second research question (What are the socioeconomic impacts of skills development training on the RIGHT graduates?) is intended to investigate the socioeconomic impacts of the skills development program on the personal and professional development of the trained youth. Findings from the interviews revealed that the graduates were equipped with theoretical knowledge, practical skills, and on-the-job experience through the RIGHT program. After the program, the graduates also improved their employability skills, their ability to earn extra income, and their confidence in communicating and achieving work-related goals. Previous studies show that skills development training allows marginalized youth to develop basic digital competencies and

professional skills. Further, the program assists them in improving their confidence, learning, and looking for and securing employment (Garrido, Sullivan, & Gordon, 2012; Mariscal et al., 2009). Study results suggest that the program has had some success in improving the graduates' personal and professional development and has played an important role in integrating rural youth into the labor market.

The interviews also revealed that the graduates contributed to their communities by improving the access to and use of ICTs through the establishment of telecenters and the delivery of ICT-related training and services. Several studies investigating the impacts of telecenters on rural Malaysian communities have been conducted. According to Tabassum and Yeo (2015) telecenters serve as a source for disseminating knowledge and accessing meaningful information, which can in turn enhance the socioeconomic wellbeing of rural residents (Tabassum & Yeo, 2015). Another study by Ibrahim and Ainin (2009) reported that the establishment of telecenters can promote digital literacy and social inclusion and contribute to community building. An earlier study by Huggins and Izushi (2002) emphasized that telecenters can promote social connections and raise awareness of the benefits of ICTs in rural communities. In this study, although only a low number of the interviewees have experience in offering basic ICT skills training in their villages, they demonstrated their ability to share and transfer their knowledge and skills to their community. The establishment of home-based telecenters can also provide a public space for community members to gain access to ICT-related facilities, services, and training. Having access to the Internet can also promote digital equity such as allowing rural people to gain access to communication services or obtain information through e-government web portals.

The third research question (What are the effects of ICT use on the socioeconomic status of the RIGHT graduates?) aimed to investigate the effects of ICT use on the graduates' SES. The quantitative data from the online survey revealed that high percentages of the graduates were:

- secondary school educated;
- employed in the sectors of information and communication (such as IT support workers);
- currently employed.

In addition, compared to the general population, most of the employed graduates were earning close to the median monthly earnings of employees in Sarawak (RM 1,260; US$305). Statistical analyses presented under Section 4.1.3 found that ICT adoption, particularly computers and the Internet, were related to engagement in higher-paying occupations and industries. As discussed in the previous paragraph, the six-month RIGHT training improved the ICT knowledge and skill level of the graduates, improving their chances of gaining employment in better-paying occupations and industries. According to Walton et al. (2009), in developing countries basic computer literacy such as using Microsoft Office products and emailing are related to higher-paying employment and higher incomes. Wang, Khan, and Zhang (2013), on the other hand, reported that skills development training can support rural residents in moving from subsistence self-employment to quality wage employment and can help retain skilled workers in rural areas. Most rural people in Sarawak were employed in subsistence agriculture and fishing (Wang et al., 2013), causing the economic development in rural areas to significantly lag the urban areas of Sarawak. Rural youths who migrated to urban areas were also less likely to return to their villages, leaving behind a disproportionately older population (Sim, 2011). At present, the rural–urban population ratio in Sarawak is 48:52 and is estimated to hit 50:50 by 2020 (DOSM, 2016c). The continuous rural-to-urban migration could widen the digital divide. The results of this study suggest that skills development training has the potential to increase the working-age population in rural communities and thus reduce the rural-to-urban migration in Sarawak.

6. Limitations and Future Work

This study was limited by several factors.

First, the response rate for the online questionnaire was low (47.1%). The high levels of ICT use among the graduates might be overestimated due to the use of technology-based data collection instruments (i.e., online questionnaire). Increasing the study sample size could improve the results by repeating the survey with those who completed the RIGHT program in 2017. Only 10 rural youth who completed the RIGHT

program in 2016 participated in the interviews. The interviews were carried out to better understand the findings from the online survey. These included the learning and teaching strategies applied during the training program, the reasons that motivated the graduates to establish home-based telecenters and ICT-related services in their communities, and how the training program has helped them improve their socioeconomic conditions. The number of interviewees was also limited by the lack of time and the availability of the graduates to take part in the interviews. Due to the small sample size, this study's findings are to some degree limited to communities of RIGHT graduates and are not meant to be generalized to all rural communities in Sarawak.

Second, the study's findings were limited to 20 items that were comparable in both the online survey and the three national surveys. To measure the level of ICT adoption among trained and untrained rural youth, future study should focus on determining the most appropriate indicators such as computer use and Internet access. Additionally, databases should be developed to monitor the graduates' personal and professional development before and after they joined the program to perform a time-course analysis of changes in digital literacy levels and the graduates' socioeconomic conditions. The findings of the analysis would be useful for policy makers to determine further actions required to facilitate rural youth inclusion in the labor market and to better serve their communities. It is also important to identify the ICT requirements of rural communities to ensure the program produces digital and socioeconomic outcomes that meet the needs of Sarawak's rural communities.

Third, the median earnings reported in a national survey were used as the thresholds to indicate the graduates' SES. Currently, no tool exists that determines the SES of rural Malaysian youth. More rigorous research is needed to develop an appropriate scale for measuring their SES. The SES scale would be important in helping policy makers better understand the economic and social needs of Sarawak's rural communities.

7. Conclusion

The inadequacy of basic amenities and telecommunication services contribute to the digital divide in rural Sarawak. To bridge the digital divide, many ICTD initiatives have been carried out in Malaysia to establish telecenters and provide skills development training to rural villagers. The RIGHT program evaluated in this study provides a platform for rural youth in Sarawak to acquire new knowledge and skills through a six-month intensive ICT training program. Three research questions were addressed using a quantitative online survey and qualitative semistructured interviews. An analysis of ICT access and use by the RIGHT graduates revealed that they possessed basic computer and Internet literacy skills and were aware of the benefits of using technologies to engage in socioeconomic activities such as information searching, communication, and e-commerce. Findings from interviews revealed that the graduates were equipped with theoretical knowledge, practical skills, and on-the-job experience from the RIGHT training, which could help improve their work performance and expand their career opportunities and professional growth. Additionally, a considerable number of them were motivated to serve their communities by establishing home-based telecenters and providing ICT-related services. An analysis of the effect of ICT use on the graduates' SES also discovered that those who used computers and the Internet frequently were more likely to be engaged in higher-paying occupations and industries than non-users. The overall findings suggest that skills development training can facilitate ICT adoption and use by rural youth, which in turn, improves their personal and professional competencies and their ability to better serve the ICT needs of rural communities. ■

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