Section C: Survey from Lecturers

Section C is one of three surveys. In this section, the researcher asked lecturers some questions that covered the objectives described in chapter one.

![Figure 3.30: Number of Respondents from Colleges and Universities](image)

Initially, to get more accurate results of the survey, the researcher distributed about two hundreds and forty copies of questionnaires to lecturers. Only 22% of questionnaires were returned compared to the number of distributions. In Figure 3.30, the higher respondents were from UM and APIIT. Eventually, the researcher collected fifty-three respondents from different colleges and universities. The respondents covered most of the colleges and universities in Malaysia. Fourteen respondents were from public universities and twenty-one respondents were from private universities and colleges. Eighteen respondents did not specify the names of their universities or colleges.
Responses for question 1: How long have you taught the following courses?

The lecturers’ experience is important for students to gain better understanding of using CASE tools. In this survey, the researcher wanted to know the lecturer’s experience in some subjects, which are related to the usage of CASE tools.

![Bar chart showing the number of lecturers who taught Software Engineering](image)

**Figure 3.31: Number of Lecturers who Taught Software Engineering**

In Figure 3.31, twenty-eight lecturers out of fifty-three taught Software Engineering. Twenty-five respondents did not have any teaching experience in Software Engineering. Eleven of the twenty-eight respondents taught Software Engineering for one semester. One respondent taught Software Engineering for forty semesters. Twenty of twenty-eight respondents have six or less than six semesters experience in Software Engineering. Four of twenty-eight respondents have seven or more than seven semesters experience in Software Engineering.
Figure 3.32: Number of Lecturers who Taught Project Management

In Figure 3.32, forty-six respondents out of fifty-three respondents did not have any experience in teaching Project Management. Seven respondents had teaching experience in Project Management. Two respondents had one semester experience in Project Management. One respondent had a ten semester teaching experience in Project Management.

Figure 3.33: Number of Lecturers who Taught OOT

In Figure 3.33, twenty-two respondents did not have any experience in teaching OOT. Thirty-one respondents had teaching experience in OOT, which means that 62% of respondents had teaching experience in OOT. Twenty-seven of the thirty-one lecturers had
less than six semesters in teaching OOT. Four of thirty-one lecturers had more than six semesters teaching experience in OOT.

Figure 3.34: Number of Lecturers Who Taught Database

In Figure 3.34, thirty respondents did not specify any semester teaching Database. Twenty-three respondents had taught Database. Among respondents who had teaching experience, twenty-one respondents had less than six semesters teaching experience in Database. Only two respondents had more than eight semesters teaching experience in Database.

Figure 3.35: Number of Lecturers who Taught User Requirements Engineering
In Figure 3.35, forty-six respondents did not specify any semesters teaching User Requirements Engineering. Only seven the respondents had teaching experience in User Requirements Engineering. Among the respondents who had taught User Requirements Engineering, six respondents out of seven had four or less four semesters teaching experience in User Requirements Engineering. The majority of respondents did not have teaching experience in this subject. Perhaps, this subject is a relatively new subject for lecturers.

![Graph showing number of lecturers who taught Project Management](image)

**Figure 3.36: Number of Lecturers who Taught Project Management**

As shown in Figure 3.36, forty-two respondents did not have teaching experience in Project Development; eleven of respondents taught Project Development. Among respondents who taught Project Development, nine respondents had less than eight semesters teaching experience in Project Development. One of respondents had taught for ten semesters.
In Figure 3.37, twenty-three respondents had taught SAD before. Thirty respondents did not teach SAD. Seven respondents taught SAD for one semester. Five respondents taught SAD for two semesters. One respondent has taught SAD for twelve semesters.

**Responses for question 2: Which of the CASE tools do you use in your course?**

Actually, there are two sub-questions here. One is to ask the CASE tools used in this course and another one is to ask lecturers to give the resources for teaching CASE tools.
Figure 3.38 shows that there are twenty-seven respondents who did not use any CASE tools in Software engineering. Fourteen respondents used RationalRose in Software Engineering. Six respondents used SystemArchitect, and two respondents used Visio Professional in Software Engineering. Four respondents chose other four tools. The researcher concluded that RationalRose and SystemArchitect were commonly used tools in Software Engineering.

![Figure 3.39: Resources for Teaching CASE Tools Used in Software Engineering](image-url)

Study resources are important for both lecturers and students. There are many resources, which are available for students’ learning. The respondents listed out seven different resources, which are shown in Figure 3.39. Among these resources, eighteen respondents selected books for teaching CASE tools in software Engineering. The books were the most important resource for respondents to teach CASE tools.
In Figure 3.40, nine respondents used CASE tools in Project Management; forty-four respondents did not specify any tools in Project Management. Four respondents preferred using Microsoft Project, and three respondents chose RationalRose. One respondent used Visio Professional and another one used SystemArchitect. Most of the respondents who taught Project Management did not use any tool.

Figure 3.41: Resources for Teaching CASE Tools Used in Project Management
In Figure 3.41, only six respondents utilized resources to teach the tools in Project Management. Five respondents just used books as main resource to teach CASE tools in Project Management. One respondent chose on-line manual and one respondent used websites to search for information. Therefore, the researcher can say that books are the main study resource in teaching CASE tools in Project Management.

![Figure 3.42: CASE Tools Used in OOT](image)

There are more than six alternatives for teaching CASE tools in OOT shown in Figure 3.42. Thirty-six did not use any CASE tool in OOT. Eleven respondents used RationalRose to teach OOT. Two respondents used SystemArchitect in OOT.

![Figure 3.43: Resources for Teaching CASE Tools Used in OOT](image)
In Figure 3.43, there are nine respondents who used books as the main resource to teach CASE tools in OOT. Eight respondents chose websites as the main resource. Books were the first option to teach CASE tools in OOT.

![CASE Tools Used in Database](image)

**Figure 3.44: CASE Tools Used in Database**

In Figure 3.44, seven respondents used CASE tools in Database; three respondents chose RationalRose, three respondents used Visio Professional and one respondent used SystemArchitect. From Figure 3.44, it appears RationalRose and Visio Professional that are the most common tools in teaching Database.
It can be seen in Figure 3.45 that books were the most important resource for teaching CASE tools in Database. Only one respondent chose websites to search for information. Forty-seven respondents did not define any resource.

Figure 3.46 shows only five respondents out of fifty-three used CASE tools in User Requirements Engineering. Among the five respondents, two respondents selected RationalRose to teach User Requirements Engineering. One respondent chose free tools.
Here, the respondent did not give the specific names of the free tools. One respondent used Metaedit and one respondent selected SystemArchitect.

![Figure 3.47: Resources for Teaching CASE Tools Used in User Requirements Engineering](image)

In Figure 3.47, three respondents chose books as teaching resource. Only one respondent chose websites to search for information. Forty-nine respondents did not indicate any resource to teach CASE tools.

![Figure 3.48: CASE Tools Used in Project Development](image)
In Figure 3.48, only three respondents used CASE tools in Project Development. One respondent used Microsoft Project and Visio Professional to teach Project Development. One respondent used RationalRose and IEF to teach Project Development. Fifty-three respondents did not give any name of tools.

![Diagram showing resources used for studying CASE tools in Project Development](image)

**Figure 3.49: Resources Used for Studying CASE Tools in Project Development**

Figure 3.49 shows only two respondents used books to teach CASE tools in Project Development. One respondent used on-line materials to teach CASE tools. Fifty respondents out of fifty-three did not provide resources for teaching CASE tools in Project Development.
In Figure 3.50, one respondent used ABL flowchart to teach SAD; four respondents used RationalRose to teach SAD; nine respondents used SystemArchitect and four respondents used Visio Professional. Thirty-five respondents did not use any CASE tool in SAD. SystemArchitect is mostly used in SAD.

In Figure 3.51, the most commonly used resources for teaching CASE tools in SAD are books, followed by manual and vendor's document. Websites and on-line material are used less frequently. The resources not specified are also depicted in the chart.
In Figure 3.51, eighteen respondents used various kinds of resources to teach CASE tools in SAD. Among the eighteen respondents, there were ten respondents who used books as their main resources to teach CASE tools. Four respondents used on-line manual for teaching purposes in SAD; two respondents searched websites to get information about CASE tools; one respondent used on-line material and another respondent used vendor’s documentation for teaching CASE tools.

The researcher summarized the main CASE tools that respondents used to teach their subjects in Figure 3.52.

Figure 3.52: Usage of Main CASE Tools Used in Subjects

In Figure 3.52, thirty-nine respondents used RationalRose in their subjects; twenty respondents used SystemArchitect; eleven respondents chose Visio Professional; one respondent used Microsoft Project in their subjects. RationalRose is the most commonly used CASE tool in teaching subjects and then is followed by SystemArchitect.

Respondents gave many resources as shown in Figure 3.53. In this figure, books are most used resource to teach CASE tools followed by websites and on-line material. Six
respondents chose Vendor’s documentations. Here, it is quite hard to define or give the exact definition of resources such as on-line material and websites for respondents.

![Figure 3.53: Resources for Teaching CASE Tools](image)

Resources are very helpful for the lecturer. In Figure 3.53, there are fifty-two respondents who used books as the main resource to teach CASE tools. Sixteen respondents used websites to get information. Fifteen respondents used on-line material to teach CASE tools. Actually, it is not a good practice for the respondents only to use the books or websites to teach the CASE tools. Lecturers ought to use both books and websites.

Responses for question 3: Do you agree that teaching using CASE tools is necessary?

![Figure 3.54: Necessity of Teaching CASE Tools](image)
The researcher asked about necessity of teaching CASE tools in colleges and universities. In Figure 3.54, fifty-three respondents gave their comments to the teaching of the CASE tools. 30% of respondents strongly agreed that it is necessary to teach the CASE tools. 36% of respondents out of fifty-three agreed that it is necessary to teach the CASE tools. 19% of respondents were neutral. 9% of respondents agreed that it is not necessary to teach the CASE tools, and only 6% of respondents strongly disagreed that it is not necessary to teach the CASE tools. 66% of respondents agreed that it is necessary to teach the CASE tools.

Responses for question 4: Please elaborate on your responses to question 3.
Some respondents explained that through using the CASE tools, students could have better understanding on the CASE tools and methodologies. Others said that the students benefited from learning the CASE tools because using the CASE tools was a requirement from IT organizations. Therefore, the respondents agreed that teaching the CASE tools was necessary.

Responses for question 5: How much time do you spend on using the CASE tools in each subject?
In question 5, the researcher wanted to know the period of teaching CASE tools in subjects given by the researcher. Software Engineering is a core subject to IT students. Different educators set different time durations based on the syllabus of subjects. In Figure 3.55, there are twenty-seven respondents who spent at least one hour in teaching CASE tools in Software Engineering.
Twenty-six respondents did not specify the time of teaching the CASE tools in Software Engineering. Six respondents spent ten hours on teaching the CASE tools in Software Engineering. This is the longest time to teach the CASE tools compared to other group of respondents. Four respondents spent fourteen hours to teach the CASE tools in Software Engineering. The researcher found that there were seven respondents who specified hours ranged from one to twenty-eight hours. Different respondents have different time schedules of teaching the CASE tools in Software Engineering. There is no standard to identify how much time they should spend in teaching CASE tools in Software Engineering.

Figure 3.55: Hours Spent Teaching in Software Engineering

Figure 3.56: Hours Spent Teaching in Project Management
In Figure 3.56, there are only four respondents who taught Project Management. Forty-nine respondents did not define the hours of teaching in Project Management. One of the respondents spent eighteen hours to teach CASE tools in Project Management. One the respondent used eight hours to teach the CASE tools in Project Management.

![Figure 3.57: Hours Spent Teaching CASE Tools in OOT](image)

More and more colleges and universities offered OOT to students. Students are given more practice using CASE tools in OOT. In Figure 3.57, twenty-one respondents spent certain time teaching CASE tools in OOT. Four respondents spent twelve hours teaching CASE tools in OOT, and three respondents spent ten hours teaching CASE tools in OOT. Among twenty-one respondents, fourteen respondents spent two or less than two hours teaching CASE tools in OOT. Thirty-two respondents did not allocate their time into CASE tools in OOT.
CASE tools are used in designing a Database. CASE tools help students to design entities and classes in Database design. In Figure 3.58, six respondents used CASE tools in Database with a range from one to forty hours.

According to requirements from IT organizations, Software developers commonly used CASE tools to analyze the user requirements. In teaching places as shown in Figure 3.59, the researcher found that there were three respondents who used the CASE tools in User Requirements Engineering in this studies. One respondent spent fourteen hours in
teaching the CASE tools in User Requirements Engineering and other two spent five and six hours in teaching the CASE tools.

![Figure 3.60: Hours Spent Teaching CASE Tools in Project Development](image)

Project Development involves many areas such as analysis, design and implementation. CASE tools can be implemented into many phases to help developers to improve work effectively. Lecturers encourage students to use CASE tools in their assignments and projects. In Figure 3.60, one respondent spent one and half hours to teach CASE tools; another respondent spent four hours to teach CASE tools; one respondent spent fourteen hours to teach CASE tools. Fifty respondents out of fifty-three did not specify how many hours they spent in CASE tools in Project Development.

![Figure 3.61: Hours Spent Teaching CASE Tools in SAD](image)

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SAD is a core subject in an IT course and is to give students a basic understanding of software development process. Most educators provided this subject for the students. Some colleges and universities used CASE tools in SAD. In Figure 3.61, there are twenty respondents out of fifty-three taught the CASE tools in SAD. Three respondents taught the CASE tools for fourteen hours followed by three respondents with fourteen hours in SAD. One respondent taught the CASE tools in SAD for twenty-eight hours. The rest of the respondents spent hours ranging from one to twenty-four hours.

<table>
<thead>
<tr>
<th>Subjects with spent hours</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>OOT</td>
<td>21</td>
<td>1</td>
<td>42</td>
<td>16.00</td>
<td>11.70</td>
</tr>
<tr>
<td>Database</td>
<td>6</td>
<td>1</td>
<td>40</td>
<td>10.16</td>
<td>14.87</td>
</tr>
<tr>
<td>User Requirements</td>
<td>3</td>
<td>5</td>
<td>14</td>
<td>8.33</td>
<td>4.93</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Development</td>
<td>3</td>
<td>1</td>
<td>14</td>
<td>8.33</td>
<td>4.93</td>
</tr>
<tr>
<td>SAD</td>
<td>20</td>
<td>1</td>
<td>28</td>
<td>9.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>27</td>
<td>1</td>
<td>28</td>
<td>11.63</td>
<td>7.21</td>
</tr>
<tr>
<td>Project Management</td>
<td>4</td>
<td>1</td>
<td>18</td>
<td>7.62</td>
<td>7.45</td>
</tr>
<tr>
<td>Valid N</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The researcher has summarized the hours spent in subjects in the table above. From Table 3.1, it can be seen that mean of hours spent in OOT is 16, which is highest mean hours spent in all subjects followed by eleven hours spent in Software Engineering. Therefore, the researcher concluded that the lecturers spent more than ten hours teaching using CASE tools in OOT and Software Engineering.
Responses for question 6: How well are you aware of the industry’s requirements for using CASE tools?

![Pie Chart showing awareness of using CASE tools]

Figure 3.62: Awareness of Using CASE Tools

CASE tools have been used for many years in IT organizations. In some organizations, having skills on how to use the CASE tools is necessary. Some colleges and universities have realized the importance of the CASE tools in software development. In Figure 3.62, 8% of respondents were fully aware of usage of the CASE tools in IT organizations. 23% of respondents were strongly aware of the importance of using the CASE tools in IT organizations. 50% of respondents were aware of importance of using the CASE tools required from IT organizations. 13% of respondents had little awareness of the importance of using the CASE tools in IT organizations. Only 6% of respondents were not aware of using the CASE tools in industrial line. Generally, the researcher can conclude that 81% of respondents have awareness on the importance of using the CASE tools in IT organizations.
Responses for question 7: Is it easy to teach students how to use CASE tools?

In this question, the researcher evaluated the usage on kinds of CASE tools. In Figure 3.63, the researcher summarized the two main tools, which were RationalRose and SystemArchitect in colleges and universities. Twenty-two respondents agreed that RationalRose was fairly easy. Ten of respondents said that RationalRose was very easy. Six respondents out of forty-three commented that RationalRose was easy and four respondents said that RationalRose was not very easy. Ten respondents did not define the ease of usage of RationalRose.

Thirty-two respondents did not give their comments on SystemArchitect. Six respondents out of twenty-one said that SystemArchitect was easy, followed by six respondents with fairly easy comments. Seven respondents commented SystemArchitect was very easy to use. One respondent agreed that SystemArchitect was not very easy; another respondent thought SystemArchitect was extremely easy to use.

![Figure 3.63: Ease of Usage of CASE Tools](image-url)
Responses for question 8: Do you think that you have sufficient time to deliver the knowledge of CASE tools to students?

Some factors affected the effectiveness of teaching CASE tools in colleges and universities. Generally, time is one of main factors to teach the CASE tools for lecturers. In Figure 3.64, 8% of respondents said that the time of teaching the CASE tools was insufficient at all. 28% of respondents commented that the time was not very sufficient; 45% of respondents agreed that the time was sufficient. 13% of respondents said that the time was very sufficient and 4% of respondents said that the time was extremely sufficient.

![Pie chart showing sufficiency of time](image)

Figure 3.64: Sufficiency of Time

One respondent did not specify any scale. Therefore, the finding of this question was that 36% of respondents agreed that the time was not sufficient to teach the CASE tools and more than 62% of respondents were satisfied with the time for teaching the CASE tools.
Responses for question 9: In your opinion, what are the basic requirements to teach CASE tools to students?

![Bar Chart: Basic Requirements to Learn CASE Tools]

Figure 3.65: Basic Requirements to Learn CASE Tools

To make sure that students have good understanding about CASE tools and apply into working places later, the student must have basic knowledge before learning the CASE tools. In this survey, lecturers were asked to give suggestions on some areas. In Figure 3.65, forty-one respondents said that having knowledge on OOT and SAD was necessary. Twenty-nine respondents said that having knowledge in Software Engineering was necessary to learn the CASE tools. In general, most of the respondents agreed that having knowledge on OOT was a basic requirement to learn the CASE tools, followed by SAD and Software Engineering.
Responses for question 10: Do you think that universities or colleges have provided the necessary infrastructures to teach CASE tools?

![Pie chart showing responses to the question](image)

**Figure 3.66: Sufficiency of Infrastructure**

Infrastructure is one of factors that enable the teaching of the CASE tools for lecturers. Enough seats in labs and PCs will ensure that students can fully utilize the resources for practising the CASE tools. Figure 3.66 shows 40% of respondents agreed that the infrastructure is sufficient to teach CASE tools. 4% of respondents agreed that infrastructure was extremely sufficient; 13% of respondents said that infrastructure was very sufficient; 26% of respondents out of fifty-three indicated that the infrastructure was not very sufficient and 15% of respondents said that the infrastructure was not sufficient at all. 2% of respondents did not give comment on this. Therefore, the conclusion can be made that 57% of respondents agreed that the infrastructure was sufficient and 41% of them commented that the infrastructure was not sufficient to teach the CASE tools.
Responses for question 11: What are your expectations of students’ ability in using CASE tools after graduating from the universities or colleges?

In this survey, regarding the students’ skills, some of the lecturers hoped that the students would be able to have basic understanding in CASE tools and use them to handle the tasks in working places. Some lecturers agreed that the students should have skills in SDLC.

Response for question 12: What problems did you have in teaching CASE tools?

Most of the respondents commented that the time was a main problem. Some of the respondents agreed that the cost of CASE tools could limit the use of CASE tools.

Response for question 13: what are your suggestions in improving students’ skills in using CASE tools?

Some respondents suggested that the vendors should provide an educational version of CASE tools with low prices. Some respondents argued that the colleges and universities should provide adequate infrastructure to teach CASE tools. Most of the respondents expected that more practical assignments and projects should be given to students.

3.5.1 Discussion of Some Factors Found from the Different User Groups

The researcher analyzed each question in the previous sections. The researcher found that some other areas should be discussed. In order to give readers a deeper understanding about the usage of CASE tools, in this section, the researcher wanted to discuss some critical factors, which are involved in three groups of people.

1) Time of Learning CASE Tools

In this research, the researcher found that the time of learning CASE tools was a main concern from lecturers and students. The students said the time of learning
CASE tools was a main limitation compared with other factors. Based on the finding from previous sections, Figure 3.67 indicates that more than 64% of respondents said that they did not have enough time to learning the CASE tools. However, the lecturers in this survey said that 62% of lecturers were agreed that the time of teaching the CASE tools was sufficient. There is a quite difference between student’s perceptions and lecture’s perceptions. The researcher suggested that educators should set reasonable time schedules for teaching the CASE tools based on the complexity of the CASE tools.

![Figure 3.67: Comparison of Time Factors from Students and Lecturers](image)

2) Lecturer’s Experience in Teaching Subjects

The lecturer’s experience is a critical factor for students. The researcher made an analysis on the lecturer’s experience in teaching some main subjects in this research. Table 3.2 indicates that fifty-three lectures were asked in this research. The highest mean in Table 3.2 is 4.82. Most probably, the lectures had more experience in teaching Software Engineering. But most of the lecturers only taught less than five semesters. The lowest mean is 3.26. The lecturers did not have much more experience in teaching Database than other subjects. Therefore, the conclusion can be made that the lecturers had experience in teaching some core
subjects. Based on the finding in this research, the research suggested that lecturers should have more opportunities to obtain experiences.

Table 3.2: Lecturer’s Experience in Teaching Subjects

<table>
<thead>
<tr>
<th>Lecturers</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semesters Taught in Software Engineering</td>
<td>28</td>
<td>1</td>
<td>40</td>
<td>4.82</td>
<td>7.454</td>
</tr>
<tr>
<td>Semesters Taught in Project Management</td>
<td>7</td>
<td>1</td>
<td>10</td>
<td>3.71</td>
<td>3.302</td>
</tr>
<tr>
<td>Semesters Taught in OOT</td>
<td>31</td>
<td>1</td>
<td>20</td>
<td>3.94</td>
<td>3.941</td>
</tr>
<tr>
<td>Semesters Taught in Database</td>
<td>23</td>
<td>1</td>
<td>8</td>
<td>3.26</td>
<td>2.359</td>
</tr>
<tr>
<td>Semesters Taught in User's requirements</td>
<td>7</td>
<td>1</td>
<td>11</td>
<td>3.71</td>
<td>3.352</td>
</tr>
<tr>
<td>Semesters Taught in Project Development</td>
<td>11</td>
<td>1</td>
<td>10</td>
<td>4.09</td>
<td>2.773</td>
</tr>
<tr>
<td>Semesters Taught in SAD</td>
<td>23</td>
<td>1</td>
<td>12</td>
<td>3.96</td>
<td>3.457</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3) Purposes of Using CASE Tools

According to the study, the researcher found that basically, the students were familiar with most of the features of CASE tools, which were used in IT companies.

Table 3.3: Features Used in Two Different Groups

<table>
<thead>
<tr>
<th>Features of CASE Tools</th>
<th>IT Professionals</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of Risk</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cost Estimation</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Generation of Documentation</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Diagrams</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3.3 indicates that in this study, the IT professionals used some features of the CASE tools in software development. On the other side, the students used the similar features in their study. Therefore, the conclusion can be made that the students should be able to use the basic features of the CASE tools.
4) Resources of Learning CASE Tools

After having analyzed the result collected from students, lecturers and IT professionals, the researcher found that there were much difference between students and IT professionals in term of resources of learning CASE tools. In Table 3.4, the IT professionals have more alternatives to search for information about case tools. However, most of the students learned CASE tools by reading textbooks given by their lectures.

**Table 3.4: Resources of Learning CASE Tools**

<table>
<thead>
<tr>
<th>Resources</th>
<th>IT professionals</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>CASE tool community websites</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Manuals of CASE tools</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Forums of CASE tools</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Training courses</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

*1: Most often used resources, 5: Least often used resources*

From Table 3.4, it can be seen that the most often used resource was the manuals of CASE tools. Second resource was the CASE tool’s communities. Compared with students, the IT professionals were able to learn the CASE tools faster than the students. The most of CASE tools vendors have their own different methodologies to present the software development process. The most effective and flexible way to learn the CASE tools is to learn their manuals. However, the books are not able to give users a specific guideline for a particular CASE tool. Compared to the student’s learning approach, the IT professionals will be able to have more resources and much help in learning the CASE tools. To improve the skills of using the CASE tools, the researcher suggested that:

1. Students should improve learning skills and know how to explore the information about CASE tools through Internet.
2. Lecturers should give sufficient help in learning the CASE tools.

3. More ways should be used to learn CASE tools.

3.6 Conclusion

In this chapter, the researcher analyzed all data collected from interviewees and respondents.

In section A, the researcher asked some questions about the background of IT organizations, comments to students’ skills, suggestions about using CASE tools and CASE tools’ utilization in their companies. Through interviewing the IT professionals, the researcher first found that most of the participants believed that CASE tools were very helpful in software development in terms of better communication, standardization, faster coding and documentation generation. Second, interviewees also pointed out the issues and concerns about using CASE tools such as cost of CASE tools, extra training cost, complexity of CASE tools and people’s skills. Third, the IT professionals commented that as fresh IT graduates, they should know some basic concepts of OOT and SAD, have basic skills in using CASE tools. These are really practical and relevant to industrial requirements. Fourth, most of the interviewees were confident that more and more IT organizations would use CASE tools in future.

In section B, the researcher distributed questionnaires to students. After analyzing the collected data, the research discovered some facts about using CASE tools in colleges and universities. First, most of the respondents have basic knowledge in OOT and SAD. The respondents also applied the OOT and SAD in their assignments and projects frequently. Second, the majorities of the respondents have learnt CASE tools before, and did believe that CASE tools were helpful in improving software skills. They used CASE tools to
analyze the user requirements and draw diagrams. Third, the main tools implemented in colleges and universities were RationalRose and SystemArchitect. Other tools were seldom used. Fourth, more than half of the respondents were not really satisfied with the infrastructure and lecturer’s guidance. Finally, the respondents commented that time, learning approach and complexity of CASE tools were factors that affected the CASE tools learning and expected that lecturers should give them more assignments and projects that were closed to real businesses.

In section C, the researcher investigated the lecturers who used CASE tools to teach some subjects. After completing the investigation, the researcher found that most of the respondents had enough teaching experience in some subjects using CASE tools, and they have realized the importance of using CASE tools in industrial environment. Most of the respondents were satisfied with the time and infrastructure regarding teaching CASE tools in their colleges and universities. The researcher discovered that there was a difference among the respondents in terms of teaching time. Furthermore, the respondents pointed out that the cost of CASE tools, ease of tools, lab space and lack of resources are main issues and problems in implementing CASE tools. Finally, they suggested giving students more assignments and hands-on practice.

To get more comprehensive analysis, in the final section, the researcher analyzed the three groups with a multi-dimension approach. Through comparing and analyzing the three groups people, the readers are able to clarify some certain issues in terms of time, learning resources and features used in different environments.

Based on the finding in this chapter, in the next chapter, the researcher will develop a collaborative system to enable the CASE tools users and vendors to share the CASE tools knowledge and promote the usage of CASE tools.