Students' Perceptions of Using Information and Communication Technology as an E-Learning Method

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Abstract. Nowadays, ICT is used as a catalyst in e-learning to improve the quality of the teaching and learning processes. E-learning primarily incorporates interactive multimedia elements to involve and appreciate learners in the learning process. Multimedia applications provide interactive features, navigation, attract students and also help students to focus more during the learning process. This paper focuses on student perceptions of e-learning as a method of teaching and learning. The study sample consists of two groups of students: group A for traditional approach of learning and group B for e-learning approach. Moodle is used as a platform for e-learning. The research tool uses questionnaires and log data from the activity of Moodle. The questionnaire results are analyzed using SPSS software. From the analyzed data on student’s perception of traditional learning, 53% of students deny that this approach allows them to develop their current understanding of learning. 26.7% of respondents strongly disagree that content is appealing in traditional teaching delivery. A total of 55% of students agree to the use of multimedia e-learning to increase student understanding. Multimedia e-learning was interesting and enjoyable to use, according to the findings, 75% of respondents agreed. The study shows that the student's perception of multimedia e-learning helps to increase the student's performance. The result has shown that students have demonstrated better learning performance through e-learning.

1. Introduction
According to (Azura et al., 2009, Khan and Jumani 2012), traditional learning methods are unable to attract and stimulate the learning process of students. Not many activities can be incorporated into teaching and learning practices and it is only include interaction between students and lecturers during the time provided. Khan and Jumani (2012) verify that the traditional teaching and learning methods focus only on face to face meeting.

The use of ICT in the online teaching and learning process is not unusual in this century. This method is intended to replace the traditional method. A paradigm shift from face-to-face teaching environment to a more technology-based learning environment has witnessed the conduct of education in this 21st century (Yap Wei Li, 2016; P V Fernandes & S Caeiro, 2019). The development of education has been influenced by the advancement of ICT. As stated by Zare et al. in 2016, ICT provides opportunities in education sector especially in teaching and learning process.

E-learning activities provide convenient features compared to traditional methods such as online activities, interactive learning material, e-forum discussion, and quiz evaluation. Therefore, multimedia e-learning provides learning content to improve their learning outcomes

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Multimedia e-learning content is applied using Moodle as an open source system that highlights application for online learning. Jamaluddin and Zawanah (2010) have confirmed that Moodle is used as a production tool for learning materials and has been chosen as an educational institution tool to communicate within the community, share teaching materials, design quizzes, and so on.

2. Literature review

2.1. Information and Communication Technology (ICT)
Information and communication technology (ICT) as a global requirement to exchange traditional teaching methods with a technology teaching based and learning tools (Ghavifekr & Rosdy, 2016). According to McKnight et al. (2016), a successful digital conversion for classrooms, districts, and states is not determined by the technology, but by how technology enables teaching and learning. Hence, ICT provides opportunities in education sector especially in teaching and learning process (Chan, 2010; Zare et al. (2016).

2.2. Multimedia E-learning
E-Learning provides a variety of facilities that can be used in the teaching and learning process. It combines primary information for the technological newbie with sophisticated thoughts for use of technology in the classroom (Tyley, 2012). Thus, teachers need to provide realistic thinking and guidance on methods to use technology to enhance and support student learning. In addition, the use of e-learning can indirectly improve the method of teaching system. The defense of this statement is agreed upon by Applied E-Learning and E-Teaching in Higher Education in 2010, stated that student knowledge and experience can be improved through the use of e-learning software throughout the teaching and learning process.

Information communication can be done in a more effective and it can be an effective teaching medium for conveying information. Malalasekera and Walsh, 2007; Wai Kit Wong and Poh Kiat Ng 2016 reported that communication is easier to use, the navigation facility needed to be include in teaching and learning needs to be determined. Meanwhile refer to Abbas in 2012, people learn better from words and pictures than from words alone. Thus, the use of multimedia elements can stimulate the human senses (Wang et al. (2005); Mayer, 2005; Manjit and Ramesh, 2006; Kim and Gillman, 2008; Rizal, A. et al., 2009; Kavita Saini et al; 2014; Fei Li et al 2014). The interactive multimedia e-learning helps student to be more creative in thinking during learning process. Online learning helps make students happy and effective. As claimed by Karl & Jams (2006); Amal & Lama (2018) the transition to online learning from traditional approaches can be particularly effective.

Hence, studies show that students’ perceptions of online learning are far better than traditional learning. In addition, e-learning methods can help students perform a variety of activities during the learning process. Previous studies by Sachiko Matsunaga (2016); T. Almarabeh (2018) clarified that online activities required students to post their replies to one of the discussion questions after studying, comment on the posting of their reply by another student, take online quizzes and submit to the instructor at the end of the course a self-reflection of learning.

This shows, e-learning gives students positive impression of their comfort throughout the learning process. As identified by S Bali & M C Liu (2018), online learning brings students comfort because the use of computer technology gives them the chance to be innovative.

Moreover, e-learning allows students to implement the learning process anytime or anywhere. Research by R.S. Mamattah in 2016 found that e-learning provides the learner with flexibility and comfort in order to complete the course materials and when they want to. Statistical findings by Snowball in 2014 showed that more active online platforms were most useful in improving student performance, such as multiple-choice and graphics questions. The combination of ICT and e-learning has a positive impact in helping to improve student performance. Sankey, Birch, & Gardiner in 2011
justify that the preparation of developing a quality, interactive and engaging curriculum by using educational technology can improve student performance and involvement. Furthermore, Traphagan, Kucsera, & Kishi, 2010; Belfi et al. in 2015 stated that student knowledge increased as a result of using e-learning. Moreover, Mohammadyari & Singh, 2015; Khasawneh et al. (2016) identified that electronic learning allows individualized education and may improve student performance. On the whole, this method also provides the opportunity for educators to diversify the more innovative way of education.

2.3. Modular Object-Oriented Dynamic Learning Environment as Platform e-learning

Modular Object-Oriented Dynamic Learning Environment (Moodle) developed by Martin Dougiamas on the basis of teaching principles (Hua et al., 2006) is an open source course management system (CMS) also known as the Learning Management System (LMS). Moodle was designed to help educators and learners to develop e-learning tools. Moodle allow users to post news items, assign and collect assignments, post electronic journals and learning resources. According to (Ismail and Norjannah 2010; Sach, 2012; Titian Panyajmoran.et al., 2018); Amal & Lama (2018), Moodle special features include materials of e-learning more comprehensive and interactive features.

3. Data and methodology

3.1. Data

The research population was applied to a group of graduate students in computer science (multimedia) at Pahang Kuantan College. The sample consisted of 4 semester students working on the subject of Instructional Design. The sample is divided into two groups, Group A (n=20), using traditional methods of learning. Group A was provided with a questionnaire to obtain data on the use of learning methods and group B (n=20) using an e-learning method. Although group B questionnaires have been provided, information is also collected through log data in Moodle.

The objective is to compare the perception of the use all teaching methods. In traditional method the data collected by questionnaire. The questionnaire is divided into demographic information, student perception learning effectiveness and content in traditional learning. The multimedia learning questionnaire is divided into the knowledge of students in e-learning, performance of students in multimedia learning, and perception of students in Moodle. The questionnaire is developed and measured using five point Likert scale range: 1-Strongly disagree, 2- Disagree, 3- Neither agree, 4- Agree and 5- Strongly agree. The data collected is translated into specific codes that will represent the variables as shown in the questionnaire. Data was analyzed using descriptive analysis methods such as frequency, percentage and mean.

3.2. Methodology

The research methods used are between traditional learning and multimedia learning. This study examine about student perception on traditional learning, investigate the effectiveness and perception on traditional learning content. E-learning is an interactive learning method that transforms traditional learning into interactive multimedia learning. Furthermore, e-learning has various interactive features to design multimedia learning material like presentation, words and visual information, online forums and quiz. Moodle are one of the platform provide the interactive features for e-learning. Research conducted focuses on student perceptions of e-learning, e-learning effectiveness and student perception of e-learning content.

4. Results

4.1. Student Perception of Traditional Learning

The analysis was conducted to identify traditional learning perceptions. Table 1.0 summarizes the findings of the study. The findings showed that 30% of respondents strongly disagreed that traditional
learning is interesting and enjoyable to use. In a meantime, 26.7% strongly disagree compared to only 10% strongly agree on the declaration of interesting content in traditional teaching methods. In addition, 53.3% disagree meanwhile 13.3% are strongly disagreed, 13.3% of respondents are agreed otherwise 10.0% strongly agree, furthermore 50.0% disagree however 23.3% strongly disagreed with the statement of Traditional teaching helps me improve in understanding the subject that I am studying. The min benchmarking from another result by Clement and Keith (2007) found that the student perception in traditional learning. The min is around 3.5.

Table 4.1: Student Perception of Traditional Learning

| No. | Student Perception in Traditional Learning | SD | D | NA | A | SA | MIN | MIN |
|-----|------------------------------------------|----|---|----|---|----|-----|-----|
| 1.  | The traditional learning was interesting and pleasant to use. | 30.0 | 36.7 | 6.7 | 23.3 | 3.3 | 2.3 | - |
| 2.  | The interesting content delivery in traditional learning method. | 26.7 | 20.0 | 23.3 | 20.0 | 10.0 | 2.8 | 3.5 |
| 3.  | Traditional learning teaching helps me improve in understanding the subject that I take. | 13.3 | 53.3 | 10.0 | 13.3 | 10.0 | 2.5 | 3.58 |
| 4.  | The use of traditional learning methods makes me more interested in learning sessions | 23.3 | 50.0 | 3.3 | 16.7 | 6.7 | 2.3 | - |
| 5.  | Learn to use this method not boring me | 33.3 | 16.7 | 16.7 | 23.3 | 10.0 | 2.6 | 3.75 |

* SD - Strongly Disagree, D – Disagree, NA - Neither, A – Agree and SA – Strongly Agree

4.2. The Student Perception of the Traditional Content

50.0% disagree with the statement of the material helps in the process of teaching and learning. In addition there are respectively 16.7% of the respondents agree and strongly agree. Furthermore, 20.0% strongly disagree meanwhile 43.3% do not agree with the statement of the materials are easy to understand. Moreover, 46.7% disagree otherwise 29.9% strongly disagree when it is said that examples available in the module easy for me to understand in traditional learning. The mean score of 2.0 for item 4, which is the statement of the use of traditional methods, is one way of attracting students to concentrate in class. Results of the study found that 33.3% strongly disagreed instead 50.0% of respondents disagreed, 3.3% agreed however 6.7% strongly agree. Besides that, there are 16.7% of respondents that agree nevertheless 10.0% strongly agree about the statement of the information presented is easy for me to understand. Additionally, there are significant differences in which 53.3% disagree and 13.3% strongly disagree on this statement

Table 4.2: The Student Perception in the Traditional Content

| No. | Questions | SD | D | NA | A | SA | MIN |
|-----|-----------|----|---|----|---|----|-----|
| 1.  | The material helps in the process of teaching and | 13.3 | 50.0 | 3.3 | 16.7 | 16.7 | 2.7 |
2. The material is easy to understand
3. Examples available in the module easy for me to understand
4. The use of traditional methods is one way to attract students to concentrate in class
5. The information presented is easy for me to understand
6. I am satisfied with the information obtained.

* SD - Strongly Disagree, D – Disagree, NA - Neither, A – Agree and SA – Strongly Agree

4.3. The Student Knowledge in the Multimedia E-Learning

The results show that 50.0% of respondents are familiar with e-learning. Besides that, 70.0% of the respondents are agreed that they have skill in using an e-learning, in addition 25% strongly agree with that too. In addition, 55.0% agreed, 45.0% strongly agreed, compared to only 5% neither that they would use e-learning to obtain learning information. Furthermore, there are 50.0% of the respondents felt that e-learning helps in the learning process. Overall, the level of knowledge of e-learning among respondents is very good with min or average results are 4.3.

### Table 4.3: The Student Knowledge in the Multimedia E-Learning

| No. | Questions                                      | SD | D  | NA | A   | SA  | MIN | MIN ** |
|-----|-----------------------------------------------|----|----|----|-----|-----|-----|--------|
| 1.  | I know what e-learning                        | -  | -  | -  | 50.0| 50.0| 4.5 | 4.3    |
| 2.  | I am skilled in the use of e-learning.        | -  | -  | 5.0| 70.0| 25.0| 4.2 | 4.1    |
| 3.  | I use e-learning for gets learning information.| -  | -  | -  | 55.0| 45.0| 4.4 | 4.3    |
| 4.  | E-learning helps me in the learning process.  | -  | -  | -  | 50.0| 50.0| 4.5 | 4.5    |

* SD - Strongly Disagree, D – Disagree, NA - Neither, A – Agree and SA – Strongly Agree
** MIN - Benchmarking from another result.

4.4. Students Perception in the Multimedia Learning Method

The findings indicated that 75.0% of respondents agree about the multimedia e-learning was interesting and pleasant to use, 20.0% strongly agree meanwhile 5.0% neither. Through this study, 65.0% of the respondents agreed and 30.0% strongly agree that content using e-learning delivery methods are interesting. In addition, multimedia teaching and learning helps improve understanding of the subject, 30.0% of respondents agreed and 55.5% strongly agreed. Furthermore, 45.0% respondents agreed and strongly agree with the use of multimedia learning methods (e-learning) make me more interested in learning sessions, however only 10.0% of respondents expressed neither. In addition, the fact of the questionnaire items indicates learning using e-learning methods is not boring, 50.0% respondents agreed and 45.0% respondents strongly agree with it. Moreover, this multimedia method of learning can make students become more creative. It found that as many as 55.0% respondents strongly agree and 35.0% agree. Besides that, 55.0% of the respondents are strongly agreed meanwhile 35.0% disagree that e-learning is very useful to them. Finally, 65.0% respondents strongly agreed and 30.0% agreed that e-learning saves time to get a reference.

### Table 4.4: Students Perception in the Multimedia Learning Method

| No. | Questions                                      | SD | D  | NA | A   | SA  | MIN | MIN |
|-----|-----------------------------------------------|----|----|----|-----|-----|-----|-----|

* SD - Strongly Disagree, D – Disagree, NA - Neither, A – Agree and SA – Strongly Agree
1. The multimedia e-learning was interesting and pleasant to use.  
2. The interesting content delivery using e-learning  
3. Multimedia learning and teaching help me improve in understanding the subject.  
4. The use of multimedia learning methods (e-learning) make me more interested in learning sessions  
5. Learn to use this method not boring me.  
6. This method of learning (multimedia) can make me more creative.  
7. E-learning is very useful for me.  
8. E-learning saves time to get a reference

| No. | Questions                                                                 | SD % | D % | NA % | A % | SA % | MIN ** |
|-----|---------------------------------------------------------------------------|------|-----|------|-----|------|--------|
| 1.  | This module helps in the process of teaching and learning                 | -    | -   | 5.0  | 50.0| 45.0 | 4.3    |
| 2.  | Examples available in the module easy for me to understand               | -    | -   | 5.0  | 60.0| 35.0 | 4.3    |
| 3.  | The use of multimedia modules is one way to attract students to concentrate in class | -    | -   | 10.0 | 45.0| 45.0 | 4.3    |
| 4.  | The information presented in this module is easy for me to understand    | -    | -   | 5.0  | 65.0| 30.0 | 4.2    |
| 5.  | Tutorial provided in accordance with the module content                  | -    | -   | -    | 70.0| 30.0 | 4.3    |
| 6.  | I am satisfied with the                                                  | -    | -   | 10.0 | 45.0| 45.0 | 4.3    |

* SD - Strongly Disagree, D – Disagree, NA - Neither, A – Agree and SA – Strongly Agree
** MIN - Benchmarking from another result.

4.5. The Student Perception of the Multimedia Module Content in E-Learning

Table 4.4 is about the student perception of the multimedia module content in e-learning. The results show that 50.0% of the respondents agree and 45.0% strongly agree that multimedia module helps in the process of teaching and learning. In addition, 60.0% agreed and 35.5% strongly agreed that the examples available in the multimedia module would be easy for them to understand. Meanwhile, 65.0% respondents agreed and 30.0% strongly agreed that the information presented in this module is easy for them to understand. Thus, respondents were very satisfied with land subsidence information obtained through e-learning.
4.6. The Student Perception in the Multimedia E-Learning Using Moodle

Through this study, it is shown that most of the respondents are adept at using Moodle. 60.0% of respondents agreed and 30.0% strongly agreed that they are very skilled at Using Moodle. In addition, 60.0% of respondents agreed and 30.0% strongly agree that they always use Moodle at home. Moreover, 50.0% of the respondents agreed and 40.0% strongly agreed with the 4.3 mean rates where the respondents were comfortable using Moodle in their learning. Furthermore, 50.0% respondents agreed and 40.0% strongly agree that using this method is easy to get learning materials. Finally, 55.0% respondents are strongly agreed and 40.0% agreed that they could save time to use Moodle for learning materials.

**Table 4.6:** The Student Perception in the Multimedia E-Learning Using Moodle

| No. | Questions                                                                 | SD | D   | NA  | A   | SA   | MIN | MIN** |
|-----|---------------------------------------------------------------------------|----|-----|-----|-----|------|------|-------|
| 1.  | I am very skilled at using Moodle                                         | -  | -   | 10.0| 60.0| 30.0 | 4.2  | 4.2   |
| 2.  | I always use Moodle at home while learning                                | -  | -   | 10.0| 60.0| 30.0 | 4.2  | -     |
| 3.  | I am very interested and comfortable using Moodle                         | -  | -   | 10.0| 50.0| 40.0 | 4.3  | 3.74  |
| 4.  | I had easy access to learning materials using Moodle                      | -  | -   | 10.0| 50.0| 40.0 | 4.3  | 4.4   |
| 5.  | Save time to get learning materials using Moodle                          | -  | -   | 5.0 | 40.0| 55.0 | 4.5  | -     |

* SD - Strongly Disagree, D – Disagree, NA - Neither, A – Agree and SA – Strongly Agree

** MIN - Benchmarking from another result.

4.7. The Student Performance using Traditional Learning

Table 4.6 below shows student performance using traditional learning method. Data was collected from student semester 4 (20paxs). The evaluation marks is 40%. According to the data below, the highest score for students is 27% (2pax) meanwhile the lowers is 16% (1pax).

**Table 4.7:** Student Performance uses Traditional Learning Method

| No. | Student | Course Marks (40%) |
|-----|---------|--------------------|
| 1   | Student A | 25                 |
| 2   | Student B | 23                 |
| 3   | Student C | 24                 |
| 4   | Student D | 25                 |
| 5   | Student E | 25                 |
| 6   | Student F | 27                 |
| 7   | Student G | 26                 |
| 8   | Student H | 23                 |
| 9   | Student I | 27                 |
| 10  | Student J | 22                 |
| 11  | Student K | 23                 |
| 12  | Student L | 20                 |
4.8. Student Performance using Moodle as Multimedia Learning
An instance of this data was collected from the student in semester 4. The assessment marks is 40%. As a result from the data below, the higher mark for students is 34% and the lowest is 12%. Students scored marks between 30% - 34% are about 12 students over 20 students. This is an increase in student performance through multimedia learning compared to traditional learning.

Table 4.8: Student Performance uses Multimedia Learning

| No. | Student | Course Marks (40%) |
|-----|---------|--------------------|
| 1   | Student A | 24                 |
| 2   | Student B | 23                 |
| 3   | Student C | 27                 |
| 4   | Student D | 31                 |
| 5   | Student E | 30                 |
| 6   | Student F | 32                 |
| 7   | Student G | 12                 |
| 8   | Student H | 29                 |
| 9   | Student I | 28                 |
| 10  | Student J | 34                 |
| 11  | Student K | 30                 |
| 12  | Student L | 22                 |
| 13  | Student M | 30                 |
| 14  | Student N | 29                 |
| 15  | Student O | 29                 |
| 16  | Student P | 30                 |
| 17  | Student Q | 33                 |
| 18  | Student R | 24                 |
| 19  | Student S | 30                 |
| 20  | Student T | 30                 |

Average: 23
Min: 16
Max: 27

4.9. Differentiate Student Performance Using Multimedia Learning between Traditional Learning
From the table 4.9 the data analyses show the marks student get after taken quiz using traditional methods and multimedia learning method. The online quiz marks are 5%. The average marks student got used multimedia learning is 3.5. The result is better than using traditional learning in which the average is 2.6. It can be stated that the use of multimedia learning in answer quiz gives students a substantial increase compared to the traditional use of learning.

Table 4.9: Quiz Performance

| Student Performance in Quiz | Course Marks (5%) |
|-----------------------------|-------------------|
| Student A                   | 24                |
| Student B                   | 23                |
| Student C                   | 22                |
| Student D                   | 29                |
| Student E                   | 28                |
| Student F                   | 34                |
| Student G                   | 30                |
| Student H                   | 29                |
| Student I                   | 29                |
| Student J                   | 30                |
| Student K                   | 30                |
| Student L                   | 24                |
| Student M                   | 29                |
| Student N                   | 30                |
| Student O                   | 30                |
| Student P                   | 30                |
| Student Q                   | 33                |
| Student R                   | 24                |
| Student S                   | 30                |
| Student T                   | 30                |
Based on data analysis, student performance using multimedia learning is much better than using traditional learning. Refer table 4.10, 55% students get A in multimedia learning method. This result better than traditional learning. Table show that, the student doesn't reach A (0%). The highest grade student receives in traditional method only get grade B about 40% and grade C in 50%.

5. Discussion and conclusion
The results of the data analysis conclude that students have a good perception of e-learning. Students are well prepared and have a good motivation to use e-learning. The study found statistically significant differences in the student’s perception of multimedia learning between traditional learning in the survey questions. Students in multimedia learning more satisfied than traditional learning methods as shown in the three questions: Q1) the traditional learning was interesting and pleasant to use, Q2) the use of traditional learning methods makes me more interested in learning sessions and Q3) learn using this method not boring me. These results have revealed that students do not give full attention to the traditional classroom because this method is not attractive to them during learning process.

Students were more satisfied and strongly agreed on the multimedia module to be studied in this questionnaire: Q1) this module helps in the process of teaching and learning, Q2) the use of
multimedia modules is one way to attract students concentrate in class and Q3) the information presented in this module is easy for me to understand. Learning materials such as notes, quizzes, assignments and forums have been inserted and uploaded into e-learning. Future studies should consider the use of teaching materials for traditional learning and e-learning methods, where teaching materials may be one of the factors that determine the effectiveness of learning methods. Additional research is also needed to determine which teaching material has an impact on student performance.

Reference
[1] Amal, I. L & Lama, S. A (2018). Students Perception, Attitudes And Readiness Toward Online Learning in Dental Education in Saudi Arabia: A Cohort Study. Adv Med Educ Pract. 2018; 9: 855–863.
[2] Applied E-Learning and E-Teaching in Higher Education. (2010). Applied E-Learning and E-Teaching in Higher Education. https://doi.org/10.4018/978-1-59904-814-7
[3] Belf, L. M., Bartolotta, R. J., Giambrone, A. E., Davi, C., & Min, R. J. (2015). “Flipping” The Introductory Clerkship in Radiology: Impact on Medical Student Performance and Perceptions. Academic Radiology.
[4] Chan, E. S. K. (2010). Hybrid learning: Teaching for quality learning at university. In Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics). 10.1007/978-3-642-14657-2_42
[5] De-Marcos, L., Hiler, J. R., Barchino, R., Jiménez, L., Martínez, J. J., Gutiérrez, J. A., Otón, S. (2010). An experiment for improving students performance in secondary and tertiary education by means of m-learning auto-assessment. Computers and Education.10.1016/j.compedu.2010.05.003
[6] Ghavifekr, S., & Rosdy, W. A. W. (2016). Teaching and Learning with Technology: Effectiveness of ICT Integration in Schools. International Journal of Research in Education and Science. 10.21890/ijres.23596
[7] Karl L. Smart & James J. Cappel (2006) Students’ Perceptions of Online Learning: A Comparative Study Journal of Information Technology Education: Research 5:201-219
[8] Karl, L. S & James, J. C (2006). Students’ Perception of Online Learning: A Comparative Study Journal of Information Technology Education: Research 5:201-209
[9] Khasawneh, R., Simonsen, K., Snowden, J., Higgins, J., & Beck, G. (2016). The effectiveness of e-learning in pediatric medical student education. Medical Education Online.
[10] McKnight, K., O’Malley, K., Ruzic, R., Horsley, M., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. Journal of Research on Technology in Education.
[11] Mohammadyari, S., & Singh, H. (2015). Understanding the effect of e-learning on individual performance: The role of digital literacy. Computers and Education.
[12] Paula Vaz-Fernandes & Sandra Caeiro (2019), Students Perception of a food safety and quality e-learning course: a CASE study for a MSC in food Consumption. International Journal of Educational Technology in Higher Education Volume 16, Article number: 37 (2019)
[13] Raymond Selorm Mamattah (2016), Students’ Perceptions of E-Learning. Spring 2016 | ISRN number: LIU-IBL/IMPALGC-A—16/005-SE
[14] Rodgers, T. (2008). Student Engagement in the E-Learning Process and the Impact on Their Grades. International Journal of Cyber Society and Education Pages.
[15] Sachiko Matsunaga (2016). College Students’ Perceptions of Online Learning: Knowledge Gain and Course Effectiveness. The Online Journal of Distance Education and e-Learning, April 2016 Volume 4, Issue 2
[16] Sankey, M. D., Birch, D., & Gardiner, M. W. (2011). The impact of multiple representations of content using multimedia on learning outcomes across learning styles and modal preferences. International Journal of Education and Development using Information and Communication Technology (IJEDICT).
[17] S Bali and M C Liu (2018), Students’ Perceptions toward Online Learning and Face-To-Face Learning Courses. IOP Conf. Series: Journal of Physics: Conf. Series 1108 (2018) 012094
[18] Snowball, J. D. (2014). Using interactive content and online activities to accommodate diversity in a large first year class. *Higher Education*.
[19] Strang, K. D. (2016). Predicting Student Satisfaction and Outcomes in Online Courses Using Learning Activity Indicators. *International Journal of Web-Based Learning and Teaching Technologies*.
[20] Tamara Almarabeh (2018). Students’ Perceptions of E-Learning at the University of Jordan
[21] Titye .P, Suthathip. S, Youji. K. Pornpimol. C & Thepchai. S (2018) Effectiveness of E-Learning Design and Affecting Variables in Thai Public Schools. *Malaysian Journal of Learning and Instruction* Vol. 15 (No. 1) June 2018: 1-34
[22] Traphagan, T., Kucsera, J. V., & Kishi, K. (2010). Impact of class lecture webcasting on attendance and learning. *Educational Technology Research and Development*.
[23] Tyley, S. (2012). Blended learning. *Fire Risk Management*.
[24] Zare. M, Sarikhani. R, Salari. M, & Mansouri. V. (2016) The Impact of E-Learning on University Students’ Academic Achievement and Creativity. *Journal of Technical Education and Training (JTET) ISSN 2229-8932*