Netiquette concept at the assessment of college student social competence with TOPSIS method

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ABSTRACT
Social competence for college students is important during the process of implementing the practicum. From social competence, we can find out the students' capable in several ways such as the ability to collaborate, speak in forums, reduce social conflicts in the environment, make a network and much more. In this study, it provides a solution model for assessing social competence in college students when carrying out practicum. The purpose of the study was to develop an assessment model by measuring students' social competence during the implementation of the practicum. The number of correspondents in the study was 78 students taken from the number of practicum students in Aerospace Engineering study program. The data analysis technique uses the TOPSIS method, where the results of this study will obtain the best rank of 78 practicum students who have the highest social competence value. The model of the assessment can be used by lecturers in Aerospace Engineering study program, Adisutjipto Institute of Aerospace Technology during the practicum process or after it. By having this assessment model, the advantages got for Adisutjipto Institute of Aerospace Technology is the campus can synergize in creating graduates with a global and humanistic character.

1. INTRODUCTION
The beginning of 2020 was the beginning of a difficult year, it was due to the Covid-19 virus that entered Indonesia. First time, the case of covid appeared in China and was later referred to as the coronavirus disease COVID-19[1]. There are many bad effects caused by this virus, one of them is education field. COVID-19 virus has greatly impacted most of the students' life outside the classroom[2], many students have to study at home during the COVID-19 pandemic[3]. Not only education, COVID-19 affects many aspects of human life in all aspects like business, research, health, economy, sports, transportation, worship, social interaction, politics, government, and entertainment[4]. This pandemic has directly affected higher education and the student experience[5]. There are many ways to deal with the spread of Covid-19 virus, one of them is the existence of Large-Scale Social Restrictions or PSBB[6]. In the field of education, new learning models must be applied to overcome these problems, one of them is the online learning model. The presence of the internet has encouraged developers to give new innovations and we now live in a world that is increasingly dependent on the use of internet information technology[7]. Various applications were created to meet the needs of human socialization[8]. Knowledge of ethics in cyberspace (netiquette) must be owned by people who spend a lot of time in cyberspace[9]. It creates a new problem for students and lecturers, where ethics in communication becomes a problem during the online learning process. Thus, the concept of netiquette becomes important in online learning during the pandemic[10].
Lack of knowledge in ethics which is not written in the internet for the use of email, chat, and mailing lists can bring its users to an unhealthy situation if the users do not understand the culture on the Internet[11]. In that case, the application is one of the most commonly used applications[12], [13]. Therefore, it is important to implement the concept of netiquette to the students in communicating and conducting social interactions. In Indonesia, netiquette is known as internet etiquette by internet users (netters). Politeness and communication that must be owned by students. So that they are able to support the development of social competencies owned by the students.

There are 9 assessment criteria used which are related to the concept of Netiquette. When decision makers are faced with a problem, there are several predetermined alternatives such as the MADM method with the context of selecting the problem, sorting the problem, ranking and describing the problem. TOPSIS is very suitable for the problem[14]. In practical decision problems, TOPSIS is very suitable for the problem[14] because TOPSIS offers a set of tools and it provides an assessment of the student's social competence. This method was chosen because it is able to choose the best alternative from several existing alternatives based on specified criteria[15]–[17]. Using this method, you will be able to rank from a number of alternative choices[18]. The results of this study may change, according to the weighting of the criteria. It is because users have different assessments of interest in the criteria used. There are many studies that discuss netiquette, but this study can provide an assessment of the priority scale of the weights against the criteria used and perform a rank to conduct a screening of students' soft skills for the needs of the world of work.

2. RESEARCH METHOD

This stage begins from formulation of the problem and then data collection, which is obtained from literature studies and field studies. Literature studies were taken from the journal literature and field studies. In literature, TOPSIS method is very suitable in making decisions that involve criteria to get quick and objective results. While field studies were carried out with discussions from the participants [18]. The data obtained were grouped based on needs and data analysis was carried out to obtain an appropriate model for this research that will be used for the social competence of practicum students. In this assessment of social competence using the TOPSIS method, the TOPSIS method used the principle that the chosen alternative must have the shortest distance from the positive ideal solution and the farthest from the negative ideal solution. It was used to determine the relative proximity of an alternative[19].
Using the TOPSIS method, there were several steps that must be done. First is normalized decision matrix. Normalized matrix was obtained by dividing each value of the criteria divided by the number of matrixes in each column. The normalized matrix can be done using the following equation:

\[ r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{n} x_{ij}}} \]  

(1)

Weighted normalized determined the weighted normalized decision matrix. It was obtained by multiplying the weight with the value of each attribute calculated by the following equation:

\[
\begin{bmatrix}
W_1 r_{11} & W_2 r_{12} & W_3 r_{13} \\
W_1 r_{21} & \cdots & W_3 r_{23} \\
W_1 r_{m1} & W_2 r_{m2} & W_3 r_{m3}
\end{bmatrix}
\]  

(2)

Next is determine the value of the positive ideal solution and the negative ideal solution. The ideal solution is called A+, while the negative ideal solution is called A-. To find the value of the positive ideal solution and the value of the negative ideal solution can be seen in the following equation:

\[ A^+ = \{ \max (h_{ij} \mid i \in I^+), \min (h_{ij} \mid i \in I^+), j = 1,2,..., m \} = \{h^+_{1}, h^+_{2}, ..., h^+_{m}\} \]  

(3)

\[ A^- = \{ \min (h_{ij} \mid i \in I^+), \max (h_{ij} \mid i \in I^+), j = 1,2,..., m \} = \{h^-_{1}, h^-_{2}, ..., h^-_{m}\} \]  

(4)

Next is calculate the value of the separation measure. It was done by measuring the distance from the alternative to the positive ideal solution and the negative ideal solution. The measurement of the alternative distance of the positive ideal solution is symbolized by \(D^+\) and the distance of the alternative negative ideal solution is symbolized by \(D^-\), the equation to find the value is as follows:

\[ D^+ = \sqrt{\sum_{j=1}^{m} W_j^+ (h_{ij} - h^+_j)^2}, i = 1,2,... \]  

(5)

\[ D^- = \sqrt{\sum_{j=1}^{m} W_j^- (h_{ij} - h^-_j)^2}, i = 1,2,... \]  

(6)

Next is determine the preference value for each alternative where the preference value is the proximity of the alternative to the ideal solution. The value of the preference for the alternative is symbolized by \(C_i\), which can be calculated by the following equation:

\[ C_i = \frac{D^-_i}{D^-_i + D^+_i}, 0 \leq C_i \leq 1 \]  

(7)

From the value obtained from the preference value, a rank is obtained for each student.

This assessment uses nine criteria which can be seen in table 1. The use of criteria is based on the concept of netiquette when communicating in cyberspace[20].

| Criterion | Benefit/Cost | weight of criterion |
|-----------|--------------|---------------------|
| K1 | Ability to collaborate for the benefit of learning during the practicum process | Benefit | 0,74 |
| K2 | Able to resolve social conflicts in practicum group units | Benefit | 0,96 |
| K3 | Able to interact well with all colleagues in the practicum environment | Benefit | 1,22 |
| K4 | Selfless and respect other people’s talk | Benefit | 1,09 |
| K5 | Dare to give advice without going beyond the boundaries of politeness | Benefit | 1,25 |
| K6 | Care about the conditions in the surrounding environment during the practicum | Benefit | 1,45 |
| K7 | Speak at will, without paying attention to others | Cost | 1,23 |
| K8 | Communicate properly and correctly | Benefit | 0,89 |
| K9 | Always respect and respect the interlocutor | Benefit | 1,17 |

Using the criteria showed in table 1, the scores was obtained from the distribution of questionnaires to students at the practicum, which were distributed by peers. The results showed that with a range of 1 – 5.
the criteria “very” = 5; “often done” = 4; “sometimes done” = 3; “rarely done” = 2; “never done” = 1. The weighting of the criteria values was given by the practicum supervisor by paying attention to the concept of netiquette when carrying out the weighing process.

3. RESULTS AND ANALYSIS

TOPSIS is an efficient MCDM methodology, it was first introduced by Hwang and Yoon[17] to determine the best option based on the best solution. The next stage is the selection of alternatives by choosing the right alternative using the TOPSIS algorithm[21]. The first stage of using the TOPSIS method was to create a pairwise comparison matrix. At this stage, the value of each user's criteria was compared with other users, then added up the column values of each criterion.

Table 2. Pairwise Comparison Matrix

| Students | K1  | K2  | K3  | K4  | K5  | K6  | K7  | K8  | K9  |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| M01      | 4   | 4   | 5   | 5   | 5   | 5   | 3   | 4   | 4   |
| M02      | 3   | 4   | 3   | 4   | 1   | 4   | 2   | 4   | 4.5 |
| M03      | 4   | 4   | 4   | 4   | 4   | 4   | 2   | 4   | 5   |
| M04      | 5   | 5   | 5   | 5   | 5   | 5   | 4   | 4   | 5.5 |
| M05      | 4   | 4   | 5   | 4   | 5   | 5   | 4   | 5.5 |
| M06      | 4   | 4   | 5   | 5   | 5   | 5   | 2   | 5   | 5.5 |
| M07      | 3   | 4   | 5   | 5   | 5   | 5   | 5   | 5   | 5.5 |
| M08      | 4   | 4   | 4   | 4   | 4   | 4   | 1   | 5   | 4.5 |
| M09      | 1   | 2   | 4   | 3   | 3   | 3   | 3   | 3   | 3   |
| M10      | 4   | 4   | 4   | 4   | 5   | 5   | 1   | 4   | 5   |

Table 2 is a pairwise comparison matrix, where the value was obtained from the value of each criterion for each alternative choice. By adding up each column of the matrix, the total value of each column of criteria was obtained where the value will be used for the matrix normalization stage. At the matrix normalization stage, it can use equation (1), where the results of the matrix normalization can be seen in Table 3.

Table 3. Matrix Normalization

| Students | K1     | K2     | K3     | K4     | K5     | K6     | K7     | K8     | K9     |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| M01      | 0.0149 | 0.0125 | 0.0156 | 0.0157 | 0.0166 | 0.0161 | 0.0192 | 0.0125 | 0.0123 |
| M02      | 0.0112 | 0.0125 | 0.0093 | 0.0125 | 0.0033 | 0.0129 | 0.0128 | 0.0125 | 0.0123 |
| M03      | 0.0149 | 0.0125 | 0.0125 | 0.0125 | 0.0133 | 0.0129 | 0.0128 | 0.0125 | 0.0123 |
| M04      | 0.0187 | 0.0156 | 0.0156 | 0.0157 | 0.0166 | 0.0161 | 0.0128 | 0.0125 | 0.0154 |
| M05      | 0.0149 | 0.0156 | 0.0156 | 0.0125 | 0.0133 | 0.0129 | 0.0128 | 0.0156 | 0.0154 |
| M06      | 0.0149 | 0.0125 | 0.0156 | 0.0157 | 0.0166 | 0.0129 | 0.0128 | 0.0156 | 0.0154 |
| M07      | 0.0112 | 0.0125 | 0.0156 | 0.0157 | 0.0193 | 0.0161 | 0.0256 | 0.0125 | 0.0154 |
| M08      | 0.0149 | 0.0125 | 0.0125 | 0.0125 | 0.0125 | 0.0129 | 0.0064 | 0.0156 | 0.0123 |
| M09      | 0.0037 | 0.0063 | 0.0125 | 0.0094 | 0.0100 | 0.0097 | 0.0063 | 0.0093 | 0.0093 |
| M10      | 0.0149 | 0.0125 | 0.0125 | 0.0125 | 0.0166 | 0.0161 | 0.0064 | 0.0125 | 0.0123 |

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The results of the normalization of the matrix in Table 3 can be calculated from the value of the weight of the normalized decision matrix using equation (2). The weighted normalization matrix was calculated by multiplying the weight of each criterion by the value of each column of the normalized matrix. The results of the calculation of the weighted normalization matrix can be seen in Table 4.

Table 4. Weighted Matrix Normalization

| Students | K1  | K2  | K3  | K4  | K5  | K6  | K7  | K8  | K9  |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| M01      | 0.0110 | 0.0120 | 0.0190 | 0.0171 | 0.0208 | 0.0234 | 0.0237 | 0.0111 | 0.0144 |
| M02      | 0.0083 | 0.0120 | 0.0114 | 0.0137 | 0.0042 | 0.0187 | 0.0158 | 0.0111 | 0.0144 |
| M03      | 0.0110 | 0.0120 | 0.0152 | 0.0137 | 0.0166 | 0.0187 | 0.0158 | 0.0111 | 0.0144 |
| M04      | 0.0138 | 0.0150 | 0.0190 | 0.0171 | 0.0208 | 0.0234 | 0.0158 | 0.0111 | 0.0181 |
| M05      | 0.0110 | 0.0150 | 0.0190 | 0.0137 | 0.0166 | 0.0187 | 0.0158 | 0.0139 | 0.0181 |
| M06      | 0.0110 | 0.0120 | 0.0190 | 0.0171 | 0.0208 | 0.0187 | 0.0158 | 0.0139 | 0.0181 |
| M07      | 0.0083 | 0.0120 | 0.0190 | 0.0171 | 0.0166 | 0.0234 | 0.0315 | 0.0111 | 0.0181 |
| M08      | 0.0110 | 0.0120 | 0.0152 | 0.0137 | 0.0166 | 0.0187 | 0.0079 | 0.0139 | 0.0144 |
| M09      | 0.0028 | 0.0060 | 0.0152 | 0.0103 | 0.0125 | 0.0140 | 0.0237 | 0.0083 | 0.0108 |
| M10      | 0.0110 | 0.0120 | 0.0152 | 0.0137 | 0.0208 | 0.0234 | 0.0079 | 0.0111 | 0.0144 |

Based on the values obtained in Table 4, the next step was to find the value of the positive ideal solution and the negative ideal solution. The value of the positive ideal solution was taken from the largest value from each column of alternative choices if the criteria were benefit and the smallest value was taken from each column of alternative choices if the criteria were cost. While the value of the negative ideal solution was taken from the smallest value of each alternative column of choice if the criteria were benefit and the largest value was taken from each column of alternative choices if the criteria were cost. The results of the values of positive ideal solutions and negative ideal solutions can be seen in Table 5.

Table 5. Positive and Negative Ideal Solutions

|            | A+     | A-     |
|------------|--------|--------|
| Students   |        |        |
| M01        | 0.01381 | 0.00276 |
| M02        | 0.01500 | 0.00300 |
| M03        | 0.01900 | 0.00380 |
| M04        | 0.01708 | 0.00342 |
| M05        | 0.01078 | 0.00127 |

After obtaining the value of the positive ideal solution and the negative ideal solution, the next step was to calculate the value of the separation measure. The separation measure was the distance from an alternative to a positive ideal solution and a negative ideal solution. Calculations to find the value of the separation measure can use equations (5) and (6). The results of the calculation of the value of the separation measure can be seen in Table 6.

Table 6. Separation Measure

| Students | D+     | D-     |
|----------|--------|--------|
| M01      | 0.05280 | 0.05280 |
| M02      | 0.03843 | 0.03843 |
| M03      | 0.04348 | 0.04348 |
| M04      | 0.05239 | 0.05239 |
| M05      | 0.04783 | 0.04783 |
| M06      | 0.04967 | 0.04967 |
| M07      | 0.05597 | 0.05597 |
| M08      | 0.04211 | 0.04211 |
| M09      | 0.03844 | 0.03844 |
| M10      | 0.04534 | 0.04534 |

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After the separation measure value was known, the next step was to find the preference value which was the alternative closeness to the ideal solution. To calculate the value of the relative coefficient can use equation (7). After the value of the relative coefficient was obtained, the next step was to determine the best rank of students who had an assessment of social competence. The overall value of the above calculations can be seen in Table 7.

| Students | Coefficient | Rank | Students | Coefficient | Rank | Students | Coefficient | Rank |
|----------|-------------|------|----------|-------------|------|----------|-------------|------|
| M01      | 0.7047      | 48   | M27      | 0.7500      | 36   | M53      | 0.7351      | 41   |
| M02      | 0.6119      | 59   | M28      | 0.8106      | 24   | M54      | 0.9065      | 5    |
| M03      | 0.7500      | 34   | M29      | 0.7350      | 43   | M55      | 0.9087      | 4    |
| M04      | 0.8472      | 14   | M30      | 0.7128      | 45   | M56      | 0.5981      | 61   |
| M05      | 0.7940      | 30   | M31      | 0.8561      | 9    | M57      | 0.7947      | 29   |
| M06      | 0.8141      | 21   | M32      | 0.7971      | 26   | M58      | 0.6930      | 51   |
| M07      | 0.5975      | 60   | M33      | 0.7108      | 47   | M59      | 0.8586      | 8    |
| M08      | 0.8201      | 19   | M34      | 0.5874      | 63   | M60      | 0.6462      | 58   |
| M09      | 0.4862      | 75   | M35      | 0.4377      | 78   | M61      | 0.7564      | 32   |
| M10      | 0.8546      | 11   | M36      | 0.9485      | 1    | M62      | 0.4420      | 77   |
| M11      | 0.6976      | 50   | M37      | 0.5405      | 70   | M63      | 0.5818      | 64   |
| M12      | 0.9006      | 6    | M38      | 0.5809      | 65   | M64      | 0.7351      | 42   |
| M13      | 0.7351      | 39   | M39      | 0.7351      | 40   | M65      | 0.6551      | 55   |
| M14      | 0.7947      | 27   | M40      | 0.7591      | 31   | M66      | 0.5496      | 69   |
| M15      | 0.7114      | 46   | M41      | 0.7414      | 38   | M67      | 0.8122      | 23   |
| M16      | 0.8557      | 10   | M42      | 0.4533      | 76   | M68      | 0.9485      | 2    |
| M17      | 0.7500      | 35   | M43      | 0.5512      | 68   | M69      | 0.5306      | 72   |
| M18      | 0.8510      | 12   | M44      | 0.8699      | 7    | M70      | 0.8343      | 16   |
| M19      | 0.5616      | 67   | M45      | 0.8214      | 18   | M71      | 0.7177      | 44   |
| M20      | 0.5874      | 62   | M46      | 0.6911      | 52   | M72      | 0.5623      | 66   |
| M21      | 0.9235      | 3    | M47      | 0.8451      | 15   | M73      | 0.6481      | 57   |
| M22      | 0.5000      | 73   | M48      | 0.8177      | 20   | M74      | 0.4886      | 74   |
| M23      | 0.7947      | 28   | M49      | 0.8122      | 22   | M75      | 0.6515      | 56   |
| M24      | 0.5385      | 71   | M50      | 0.7475      | 37   | M76      | 0.6846      | 53   |
| M25      | 0.7010      | 49   | M51      | 0.8005      | 25   | M77      | 0.6846      | 54   |
| M26      | 0.8473      | 13   | M52      | 0.8242      | 17   | M78      | 0.7564      | 33   |

Table 7 was an alternative choice of 78 students who did the practicum. In the table, the highest score is 0.9485 by M36 practicum students, while the lowest score is 0.4377 by M35 students. Based on Table 7, the practicum supervisor can assess the personality of each student regarding the student’s social competence, by taking the value from the best. Based on this rank, it shows that students have the potential to realize the Adisutjipto Institute of Aerospace Technology in graduating alumni with global and humanistic characters. It is because, except the hard skills, soft skills are a supporting factor.

4. CONCLUSION

This study can provide an assessment of the social competence of practicum students. In addition to hard skills, students must also have soft skills that come from social competence. It is because they are indirectly used in everyday life, especially in the world of work. Determination of criteria and weighting of criteria are very important in the use of this method, because it will affect the results to be obtained. The use of this method has shortcomings in the validation process in assigning weighting criteria. In addition, the measurement of the real results cannot be known in the short term about the accuracy of the results from the use of this method. Therefore, complementary methods are needed, which can support further research.
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