http://jurnal.ustjogja.ac.id/index.php/incotes/index

Prediction of Timely Graduation using The 5c-4c Knowledge Conversion Method in Students of Vocational Welfare Education Study Program

Siti Mariah[1], Anggri Sekarsari [2] Ika Wahyu Kusuma Wati[3]
[1,2,3]Universitas Sarjanawiyata Tamansiswa, [1,2,3]Indonesia

To cite this article:

Mariah, S., Sekarsari, A. & Wati, I.W. (2021). Prediction of Timely Graduation using The 5c-4c Knowledge Conversion Method in Students of Vocational Welfare Education Study Program. In M. Irfan, N. A. Handoyono, K. H. Najib, T. Ardhian (Eds.), *The 3rd International Conference on Technology, Education and Science* (pp. 182–193). Yogyakarta.

InCoTES 2021 ISSN: 978-602-6258-14-4

Prediction of Timely Graduation using The 5c-4c Knowledge Conversion Method in Students of Vocational Welfare Education Study Program

Siti Mariah[1], Anggri Sekarsari [2] Ika Wahyu Kusuma Wati[3]
[1,2,3]Universitas Sarjanawiyata Tamansiswa, [1,2,3]Indonesia
[1]siti.mariah@ustjogja.ac.id

Article Info

Keywords

timely graduation
Knowledge Conversion
5C-4C
study period

Abstract

The purpose of the study was to predict timely graduation for Family Welfare Vocational Education (PVKK) FKIP UST students with identified factors, namely school origin, study objectives, social studies average, history of repeating courses, history of collecting lecture assignments, history of paying tuition fees. off-campus activities, and student study time. These factors are identified using knowledge conversion 5c-4c by converting data into information with 5 added values, namely contextualized, categorized, calculated, corrected, and condensed. The population in this study were PVKK students of the class of 2019, with the technique of taking it through a questionnaire. The results of the study predict a very high increase in on-time graduation as indicated by school origin, the main purpose of choosing a PVKK study program, a history of completing assignments, a history of fluency in studies each semester with an average semester achievement index above 3.00, a history of payment of education funds that are not in arrears, and activities outside of study only sometimes show a high prediction of high PVKK students' on-time graduation. Recommendations for increasing graduation through updating the curriculum by applying problem-based learning to the introduction of school culture and field practice in schools or industry, implementing project-based learning in research methods courses with proposals as outputs, intensive mentoring on student final assignments, grouping students based on capabilities and types of research, and monitoring the mentoring process.

Keywords: timely graduation, Knowledge Conversion 5C-4C, study period.

Introduction

Departing from the problem of the percentage of on-time graduation of students from the family welfare vocational education study program which is still minimal based on data from the academic section of Family Welfare Vocational Education (PVKK) FKIP UST which shows the percentage of on-time graduation of students in Table 1, there is even a downward trend, while the number of incoming students is increasing. Many factors cause the problems mentioned above, including internal sources of students, family and community environments, as well as academic policies and services for study programs. [1][2].

Tabel 1 PVKK Student Graduation Percentage

No	Class of the Year	Number of Students	Graduation Time			
			≤ 8 sem	8 Semester	≥ 9 semester	Haven't passed yet
1.	2014/2015	77	-	20%	49%	1%
2.	2015/2016	81	-	16%	38.3%	17.3%
3.	2016/2017	116	-	4.3%	13.8%	72.6%
4.	2017/2018	151	0.6%	*on going*		

The Family Welfare Vocational Education Study Program (PVKK) is one of the study programs within the Faculty of Teacher Training and Education (FKIP) Universitas Sarjanawiyata Tamansiswa whose main goal is to produce prospective PVKK teachers in the field of culinary and fashion skills. The curriculum developed by the PVKK study program refers to the Indonesian National Qualifications Framework (KKNI) level 6 which is adjusted to the competency needs of vocational teachers for vocational schools so that the weight of practical learning is more than theoretical learning. The study program is obliged to monitor the study progress of its students. The study program also has the task of predicting the length of study for each student to determine and anticipate the occurrence of students who are 'stalled' or 'lost' which will cause the performance of the study program to be less good. [3] [4].

The study period for undergraduate programs is a maximum of 7 (seven) academic years with a study load of at least 144 credits [5]. The learning load is distributed in the curriculum structure into 8 semesters or equivalent to 4 (four years) so that it is said to graduate on time if students can complete their studies in less than and equal to 8 semesters or 4 (four) years. The information is conveyed to students during the campus orientation period, it is hoped that students can manage their study time well and set a target time for graduation. The undergraduate education program is taken for 7-8 semesters within a period of 4 years, where each semester the progress of student studies is always monitored and the time of graduation can be predicted[6][7]. However, many factors affect the delay in completing student studies, which are often hampered at the end of the study at the time of preparation of the Final Project.

Graduating on time is something that is highly coveted by every student, as well as for Institutions, both at the level of study programs, faculties, and universities [1]. Apart from being the reputation and achievement of the institution's performance, it is also one of the criteria in the accreditation assessment[8]. The cliché problem that always occurs every academic year regarding the percentage of on-time graduation of student studies is still low, it is necessary to design a design and program that can minimize these problems so that on-time graduation of students can increase.

Knowledge conversion to convert the tacit knowledge of the study program regarding student study completion activities into explicit knowledge that can be used in providing academic services to students [9] proposed a method called the SECI method to facilitate organizations in the knowledge conversion process. The SECI method is a method that discusses the steps to carry out the knowledge conversion process [10][11]. These steps consist of socialization, externalization, combination, internalization [11][7]. In this study, the stages in the knowledge conversion process were carried out to design a program to increase students' timely graduation.

The study period or length of study is the time it takes someone to take a study program at a certain strata level which is calculated through a minimum Semester Credit Unit (SKS). That is, a person's study period is said to end when he has fulfilled the learning load determined by each educational institution and has completed his final project [12]. Undergraduate (S1) students are said to have graduated on time if they have completed their studies in higher education for less than or equal to four years, while students are said to have not graduated on time if they have completed their studies in higher education for more than four years.[13]. In practice, many students do not always complete undergraduate education within four years [14].

This study aims to predict the PVKK study program students based on 5C, find out the results of the 4C process used to help design the program to increase the number of PVKK study students who graduate on time, and formulate the proposed program design to increase the number of PVKK study program students who graduate on time in the period next. The expected outcomes of this research, in addition to the publication of journal articles, are also recommendations and solutions to increase the percentage of students graduating on time.

Method

This research was conducted on students of the Family Welfare Vocational Education Study Program located in Wirogunan, Mergangsan District, Yogyakarta City, Special Region of Yogyakarta, 55151, which was held in the odd semester of the 2021/2022 academic year. The conceptual model of program design used to improve the timeliness of graduation for PVKK students is seen from the data collected in the study, namely student personal data, school origin, the purpose of continuing their studies, and data on average grades of achievement index.

All data that has been collected is converted into information using the 5C knowledge conversion method (contextualized, categorized, calculated, corrected, condensed). Then, the information is converted into knowledge using the 4C knowledge conversion method (comparison, consequence, connections, conversation) to turn it into knowledge that will be used as decision support in designing programs to increase the number of students graduating on time.

The data obtained from the data collection process is determined by its attributes. After the data is obtained to conduct research, there are several stages of data preparation. Data preparation is a stage to get quality data, then several techniques are carried out as follows :

1. Data collection - This stage explains where the data sources in this study were obtained and find information that can be used for research.
2. Initial data processing - This stage describes the early stages of data mining. The initial data processing includes the data input process in the required format.
3. At this stage, it describes the early stages of data mining. The data that has been obtained will be processed into the required format, grouping and determining data attributes. In carrying out the initial data processing, several stages will be carried out so that in the end data will be obtained that can be used at the next stage. These stages include select data and split validation.
4. The proposed method This stage describes the selection and use of the C4.5 algorithm method in this study. The following are the stages of the modeling process in this research: Choosing the appropriate Data Mining tasks, Choosing the Data Mining Algorithm, Data Mining Algorithm for the ultimate goal of a prediction. One of the calculation functions performed is to determine the Entropy value of each data attribute to be trained.

The Entropy formula is as follows:

$$Entropy(S) = \sum_{i=1}^{n} - pi * log_2\ pi$$

The flow of the formula is

1) Calculating the total number of attributes
2) Calculate the total number of attributes based on each class or label
3) steps to calculate entropy.

Evaluation

In this stage, evaluation and interpretation of the patterns obtained from the results of the algorithm used to determine the rules, reliability, and others is carried out. Evaluation is done by applying the pattern obtained from the previous process to the testing data provided.

Using the discovered knowledge

At this stage using the knowledge obtained from the data mining process for application to applications or others.

Results and Discussion

Initial data is data obtained from the results of a questionnaire to PVKK Class 2019 students and then summed and made into one data according to the existing criteria (Data is still in the process of being collected and does not meet the specified sample). Furthermore, the data will go through several stages of processing the initial data, namely: select data and split validation.

1. Select Data
   At this stage, the data variables to be analyzed are selected, because it is often found that not all data is needed for the data mining process. The selection of these variables is carried out by taking into account the purpose of writing so that several variables are obtained that will be used as input variables.

Tabel.2 Select Data

Variable	Indicator	data usage
Name	X	-
Nim	X	-
Areas of expertise	X	-
Which school are you from	V	Model value
Gender	X	-
Origin	V	Model value
NEM	V	Model value
College goals	V	Model value
number of credits taken	V	Model value
cumulative performance index	V	Model value
History of Completion of Lecture Tasks	V	Model value
History of repeating lectures	V	Model value
Tuition fee payment history	V	Model value
activities outside of study	V	Model value

Table 2 above will be used and not used in this study. The "V" indicator indicates that the variable is used, while the "X" indicator indicates that the variable is eliminated at the initial data processing stage. The elimination of some of these variables is based on the model values which are relatively the same and do not affect the results of the assessment process.

2. Split Validation
   Split Validation is a validation technique that divides the data into two parts randomly. The distribution of data into training data and testing data uses systematic random sampling. The method of using this technique is to do the randomization or lottery only once, namely when determining the first element of the sampling to be taken. The determination of the next sampling element is taken by utilizing the sample interval. A sample interval is a number that shows the distance between the serial numbers contained in the sampling frame which will be used as a benchmark in selecting the second sampling element and so on until the nth element. The sample interval is denoted by the letter k. The sample interval, also known as the sampling ratio, is obtained by dividing the population size by the desired sample size (N/n).

   The results of the calculation for taking testing data are as follows:

population (N)	= 71
Amount of testing data	= 20% x 71 = 14.2 (rounded up =14)
Number of samples (n)	= 14
Interval Sampling (k)	= N/n = 71/14 = 5.07 (rounded up = 5)
The first element taken for data testing (s)	= 1
Second element	= s + k
Third element	= s + 2k and so on until the n^{th} element

A. Converting Data Into Information

Data processing begins with the process of converting data into information using the 5C knowledge conversion method, namely Contextualized, Categorized, Calculated, Corrected, and Condensed.

1. Contextualized

In the Contextualized stage, the benefits of each data used in the study are explained. The benefits of each data are as follows:

a. Data from Respondent School

Respondents from PVKK Class 2019 students (71 people), 76.1% came from SMK, and 19.7% came from SMA, and 2.8% from MTs.

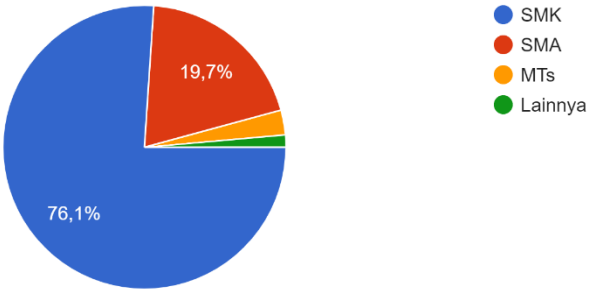

Figure 1. Respondent's School Origin

The educational background of PVKK students mostly from vocational schools shows a very high level of relevance to the PVKK field of study. Pursuing an education in the PVKK study program requires good interest, talent, and readiness, understanding the characteristics of the learning, both fashion, and catering. Students who do not understand the characteristics, objectives, and learning outcomes of the PVKK field of study may experience problems during their education because the learning characteristics of the PVKK study area have more practical learning percentages than theoretical learning (40%). Students' interests and talents following their field of study can facilitate the learning process and the completion of their tasks, especially practical learning tasks that require perseverance, diligence, discipline, and tenacity.

b. Study Program choice data

PVKK Class 2019 students who choose the PVKK study program are 85.9% of the first choice, and 12.7% of the second choice. More details can be seen in Figure 2 histogram below:

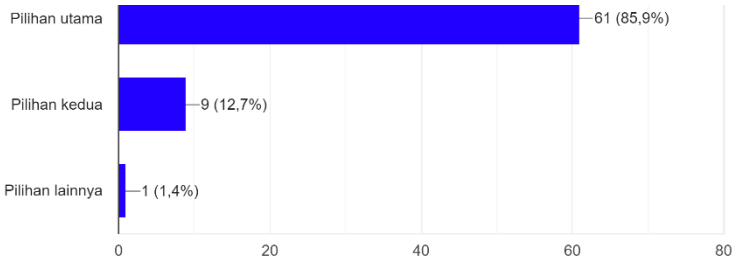

Figure 2. Histogram of student's choice of study in the PVKK study program

The description of the choice of students to continue their higher education in the 85.9% PVKK study program is the main choice, indicating the readiness of students to participate in the learning process and understand its objectives well. Readiness is one of the variables that has a significant effect on a person's success in carrying out his learning process [15][16][17][18]. Thus, students who have determined their main choice of the PVKK

study program from the beginning can be interpreted as having very high readiness to participate in the learning process and are assumed to be able to achieve good study success.

c. Purpose of continuing studies

The goals of the 2019 PVKK students to continue their studies varied, namely: the highest being 63.4% entrepreneurs, becoming teachers (36.6%) and (12.7%), practitioners / working in industry (19.7%), and 2.8% others.

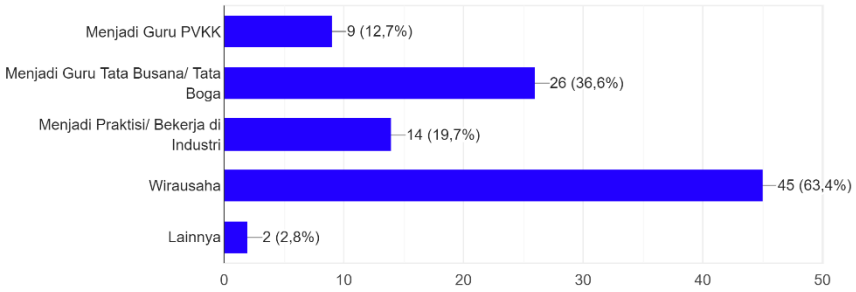

Figure 3. Histogram the purpose of students studying in the PVKK study program

Students have clear goals when determining the choice of study program they will take. Clear goals can be an indicator for students to complete their studies on time. Based on the data in Figure 4.2 which shows the goal of students continuing their studies in the vocational education program for family welfare or culinary skills is to become entrepreneurs, meaning that students already have an entrepreneurial spirit. Entrepreneurship is a creative and innovative ability that is used as a basis, and a resource to seek opportunities for success. The entrepreneurial spirit, attitude, and behavior have indicators: full of confidence, that is, full of confidence, optimistic, committed, disciplined, responsible; have initiative, the indicator is full of energy, nimble in action, and active; have an achievement motive that is demonstrated by results orientation and future insight; have a leadership spirit, the indicators are daring to be different, trustworthy, and tough in acting; Dare to take calculated risks[19].

d. History of repeating courses

One indicator that can be used to see the fluency of student studies is the record or track record of the progress of their lectures. The data in Figure 4 shows that almost all students do not have a history of repeating courses, it can be interpreted that the fluency of student studies up to semester 5 is in good and smooth condition.

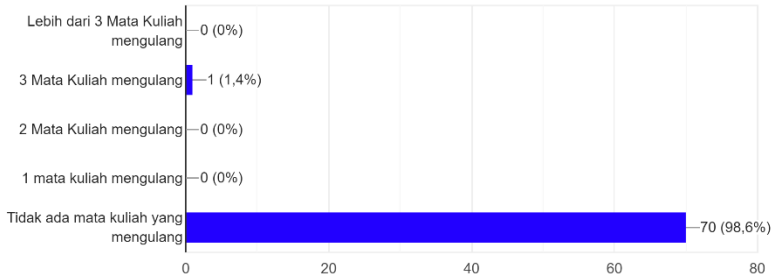

Figure 4. Histogram History of repeating courses in the PVKK study program

e. History of paying college

Another important aspect in determining the smoothness and success of student studies in higher education is funding. Students who have adequate funding guarantees to meet all their academic and life needs can certainly facilitate their learning activities. The learning process in the PVKK study program, both the expertise in Dressing and Catering requires

a large number of funds, especially the need for practical funds that must be met by students.

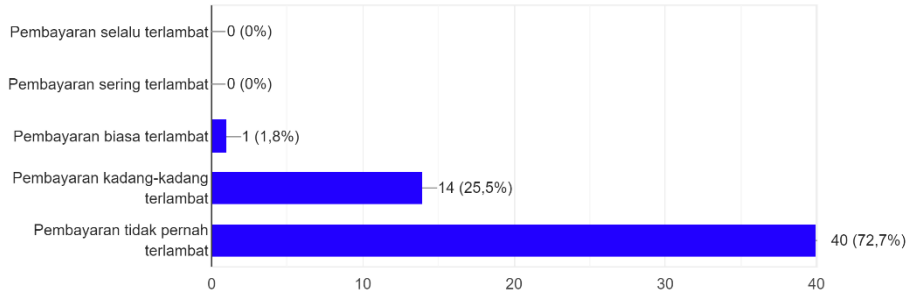

Figure 5. Histogram Tuition payment history/variable

One indicator that can be seen from the fulfillment of student study funds is the history of paying tuition fees. Tuition payment terms that cannot be met on time can result in reduced opportunities to take maximum credits. Students who still have arrears in the previous semester can only take 16 credits, while students who have fulfilled their obligations in terms of funding can take up to 24 credits if the previous semester's achievement index meets applicable regulations. The data in Figure 5 shows that most of the respondents are never late in making tuition payments, it can be explained that students' financial conditions are in a stable condition and can encourage the smooth running of their studies.

f. Activities outside of study

Student activities outside of college if not managed properly can hinder the smooth running of their studies. Learning activities at the PVKK Study Program are quite dense every semester, with learning tasks that are theoretical, practical, and field in nature. Learning tasks are not only completed on campus during lecture hours but require more time to be completed properly, so students who have off-campus activities need to manage their time well.

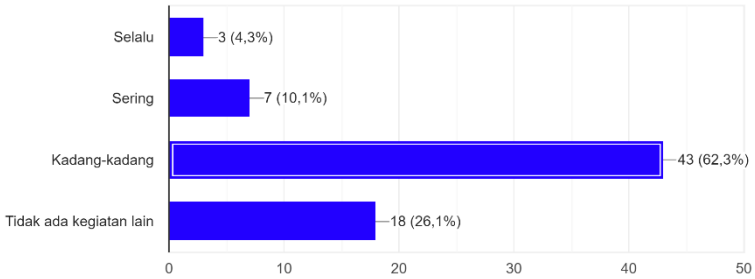

Figure 6. Histogram of respondents' activities other than studies

The data in Figure 6 shows that the majority of PVKK students sometimes have activities outside of their studies. Student activities can be in the form of on-campus or off-campus activities, however, PVKK student respondents do not show other activities besides study. Thus it can be explained that student activities are more focused on learning activities and completing their assignments so that the prediction of graduating on time is very high.

2. Categorized

In the Categorized stage, the data is categorized into several parts to be more detailed in seeing the benefits and uses of the data. The number and name of the category of each data can vary according to the information you want to get. Data from schools and cities are categorized by the province to facilitate data processing and fewer categorization groups are used. Data on study objectives in the PVKK study program consists of 6 sub-sections and learning strategies consist of 9 sub-sections. Each sub-section contained in the learning objectives data and IP score data is categorized into 9 categories. The number of categories/classes obtained from

mathematical calculations. In each category, there is a range of values used to determine the characteristics possessed by a student. The range of values contained in each category owned by each data has different values, according to the results of mathematical calculations.

The categorization of the 2019 PVKK Study Program students is carried out using the K-means algorithm clustering. The clustering process is carried out to determine the grouping of students based on similar characteristics so that it can be said that every student in one group/cluster has the same or close characteristics. The clustering process forms a composition with a total of 19 clusters, in other words, students of the 2019 PVKK Study Program are categorized into 19 Clusters.

Tabel 3. Student Cluster Calculation

No	the origin of the school	Goals	Average Semester Achievement Index	history of repeating college	history of delaying tuition payments	activities outside of study	study schedule	recommendation
1	0	0	0	0	0	0	0	Yes
2	0	0	0	0	0	0	1	Yes
3	0	0	0	0	0	1	1	Yes
4	0	0	0	0	0	1	0	Yes
5	0	0	0	0	1	0	0	Yes
6	0	0	0	0	1	0	1	Yes
7	0	0	0	0	0	1	0	Yes
8	0	1	1	0	0	1	1	No
9	0	0	1	0	1	0	1	No
10	0	0	1	0	0	1	1	No
11	0	1	0	0	0	0	0	Yes
12	0	1	1	0	1	1	2	No
13	1	0	0	1	0	2	1	No
14	1	0	0	0	0	1	1	Yes
15	1	1	0	0	0	1	1	No
16	1	0	0	0	0	1	1	Yes
17	0	1	1	0	0	2	0	No
18	1	1	1	1	1	1	2	No
19	2	0	0	0	1	0	0	Yes

3. Calculated

At this stage, the data used in the study is calculated mathematically so that the usefulness of the data can be seen more clearly and shows information about the number of respondents/students contained in each category based on each existing data. As can be seen in Table 4, regarding the calculation of the number of students based on the data of 7 specified attributes.

Tabel 4. Calculation of the number of students based on attributes

No	Attribute		number of cases	No	Yes	Entropy	Gain
	Total		19	6	13	0.899743759	
							0.150091814
1	the origin of the school	SMK	13	8	10	0.722202614	
		SMA	5	3	2	0.970950594	
		MTs	2	0	1	0	
							0.161234158
2	Goals	utama	13	3	10	0.779349837	
		kedua	6	5	1	0.650022422	
							0.475955941
3	Average Semester Achievement Index	T	13	2	11	0.619382195	
		S	6	6	0	0	
							0.899743759
4	history of repeating college	Y	2	0	17	0	
		T	17	0	17	0	
							-0.048611841
5	history of delaying tuition payments	T	14	5	9	0.940285959	
		K	5	3	2	0.970950594	
							0.168157731
6	activities outside of study	S	2	2	0	0	
		K	10	5	5	1	
		T	6	1	5	0.650022422	
							0.155443261
7	study schedule	S	7	1	6	0.591672779	
		K	10	5	5	1	
		T	2	2	0	0	

4. **Corrected**
   At this stage, it was found that data whose usefulness was not too significant in supporting this research, namely data on repeating courses. The usefulness of repeating course data is not very significant because through this data it is not possible to know the total Semester Credit Units (SKS) and the name of the course. These data can only assist in determining the timeliness of courses but do not provide information that could affect this study or the results of this study.

5. **Condensed**
   The results of data processing in the form of information, at the condensed stage are made in the form of a histogram of the process of converting data into information. The data into information, which has been calculated and corrected, is displayed in a form that is easier to understand, for example in the form of a histogram. For example, a comparative histogram of school origins based on on-time graduation recommendations.

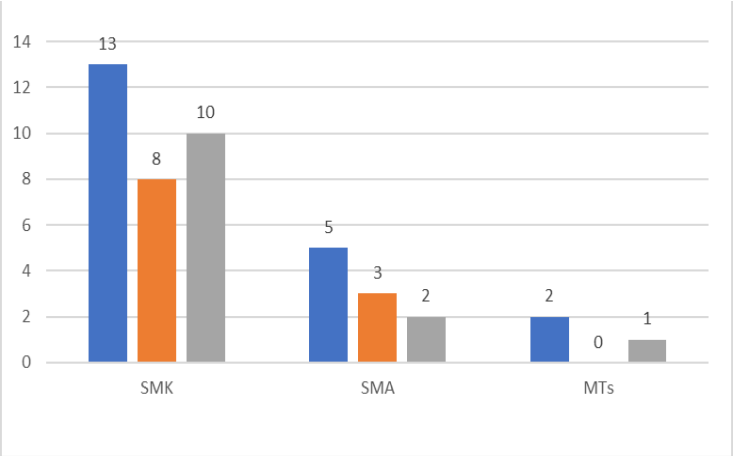

Figure 7. Comparative histogram of respondent's school origin based on recommendation Pass on time

B. Version of Information into Knowledge

Data that has been converted into information is reprocessed through the conversion process so that it can be displayed as knowledge. The process of converting information into knowledge is carried out through four stages, namely Comparison, Consequence, Connections, and Conversion.

1. Comparison
   At this stage, comparisons between clusters are carried out based on the total average of the attributes that have been sorted. This is done to determine the order of clusters that have the highest to lowest values and their characteristics. At this stage, a comparison between clusters is also carried out based on the total average that has been sorted. This is done to find out the sequence of clusters that have the highest to lowest average values and their characteristics.

2. Consequences
   In the Consequences stage, the relationship of information with other information obtained from the comparison stage is analyzed to find an implication that can be used for improvement. Referring to the various information obtained from the analysis results at the Consequences stage, it is known that the timeliness of the PVKK study program students has a relationship with the origin of the school and the purpose of continuing their studies. In addition, at the Consequences stage, it was found that there was a discontinuity between the origin of the school and the destination of further study with the achievement index value.

3. Connection
   At this stage, it is found that there is a relationship between the information that has been generated from the Consequences stage. Based on the information obtained from the Consequences stage, it was found that there was a relationship between school origin, study program selection, and the average semester performance index. This knowledge is obtained because it is based on the characteristics possessed by cluster 1 which is the cluster that ranks first in the highest total average value and has "special" characteristics.

4. Conversation
   At this stage, information that has gone through the consequences and connection stages is discussed with more expert parties to gain new knowledge about the proposed program to improve the timeliness of graduation for PVKK students. Discussions were held with the Head of the Study Program. The results of the discussion were formulated that the strategies that can be applied to increase students' proper graduation are: The design of the program to increase timely graduation is formulated through Updating the curriculum by applying problem based learning in activities to introduce school culture and field practice in schools or industry, implementing project based learning in subjects research methods with outputs in the form of proposals, intensive mentoring on student final assignments, grouping students based on abilities and types of research, and monitoring the mentoring process.

Conclusion

The results of the conversion of data into information show that the grouping of the 2019 PVKK Study Program students is divided into 5 groups/clusters; The results of the conversion of information into knowledge are used to help design programs to increase the number of PVKK Study Program students who graduate on time. Data from school origin, main choice of study program, history of study fluency, average semester grade index above 3.00 (scale 4), history of smooth tuition payments, occasional outside activities, and fairly regular study time predict graduation on time for PVKK students very high.

Recommendations

Proposed programs to increase graduation on time through: Updating the curriculum by implementing problem-based learning in the introduction of school culture and field practice in schools or industry, implementing project-based learning in research methods courses with proposals as outputs, intensive mentoring on student final assignments, grouping students based on ability and type of research, and monitoring the mentoring process.

Acknowledgements

Thank you to the Institute for Research, Development, and Community Service, Universitas Sarjanawiyata Tamansiswa Yogyakarya which has supported the funding of this research.

References

[1] Sumartini and Disman, “Analisis Faktor-Faktor yang Mempengaruhi Penyelesaian Studi Tepat Waktu serta Implikasinya terhadap Kualitas Lulusan,” *Indones. J. Econ. Educ.*, vol. 1, no. 1, pp. 43–54, 2018, doi: 10.17509/jurnal.

[2] Sudiyanto, “Evaluasi Diri Mahasiswa Terhadap Kompetensi,” *Paedagogia*, vol. 17, no. 1, 2014.

[3] A. Jananto, “Algoritma Naive Bayes untuk Mencari Perkiraan Waktu Studi Mahasiswa,” *Teknol. Inf. Din.*, vol. 18, no. 1, pp. 9–16, 2013.

[4] U. Hartato and M. N. Aisyah, "Faktor-Faktor Yang Mempengaruhi Penyelesaian Skripsi Mahasiswa Pendidikan Akuntansi Universitas Negeri Yogyakarta," *Pros. Semin. Nas. Penguatan Hub. antara Pengemb. Keterampilan, Pendidikan, dan Ketenagakerjaan Gener. Muda*, vol. Universita, pp. 131–139, 2011.

[5] Kemdikbud RI, "Kementerian Pendidikan dan Kebudayaan," *Http://Kemdikbud.Go.Id/*, no. Mei, p., 2016, [Online]. Available: http://kemdikbud.go.id/main/?lang=id.

[6] A. J. Nathan and A. Scobell, "Model Algoritma K-nearest Neighbor untuk memprediksi kelulusan mahasiswa," *Foreign Aff.*, vol. 91, no. 5, pp. 1–9, 2012, [Online]. Available: http://jurnal.unpand.ac.id/index.php/NT/article/viewFile/350/344.

[7] E. Purwanto, K. Kusrini, and S. Sudarmawan, "Prediksi Kelulusan Tepat Waktu Menggunakan Metode C4.5 DAN K-NN (Studi Kasus : Mahasiswa Program Studi S1 Ilmu Farmasi, Fakultas Farmasi, Universitas Muhammadiyah Purwokerto)," *Techno (Jurnal Fak. Tek. Univ. Muhammadiyah Purwokerto)*, vol. 20, no. 2, p. 131, 2019, doi: 10.30595/techno.v20i2.5160.

[8] M. R. Asmawi, "Strategi Meningkatkan Lulusan Bermutu Di Perguruan Tinggi," *Makara Hum. Behav. Stud. Asia*, vol. 9, no. 2, p. 66, 2005, doi: 10.7454/mssh.v9i2.124.

[9] H. Takeuchi and T. Shibata, *Japan, Moving Toward a More Advanced Knowledge Economy*, 2nd ed., vol. 2, no. 122. Washington: The International Bank for Reconstruction and Development/The World Bank, 2006.

[10] A. Tiwana, *Knowledge Management Toolkit , The Amrit Tiwana Knowledge Management Toolkit , The*, 1st ed. Prentice Hall PTR, 1999.

[11] L. Davenport, Thomas H.; Prusak, *Working Knowledge : How Organizations Manage What They Know*, vol. 2009, no. 75. Boston, Massachusetts: HARVARD BUSINESS SCHOOL PRESS, 1998.

[12] P. A. B. Hengky Pramusinto, Indri Murniawaty, "EVALUASI PROGRAM ONTIME GRADUATION JURUSAN PENDIDIKAN EKONOMI UNIVERSITAS NEGERI SEMARANG," *J. PROMOSI*, vol. 5, no. 2, pp. 27–33, 2017, [Online]. Available: https://www.ojs.fkip.ummetro.ac.id/index.php/ekonomi/article/viewFile/1211/837.

[13] I. R. & H. Yozza, "ANALISIS KAUSAL MASA STUDI MAHASISWA PROGRAM."

[14] M. Fem, D. A. N. Faperta, and M. Metode, "Analisis Ketepatan Waktu Lulus Berdasarkan Karakteristik Mahasiswa Fem Dan Faperta Menggunakan Metode Chart," *Xplore J. Stat.*, vol. 1, no. 2, pp. 1–8, 2013, doi: 10.29244/xplore.v1i2.12411.

[15] D. Darso, "Kesiapan Belajar Siswa Dan Interaksi Belajar Mengajar Terhadap Prestasi Belajar," *Innov. Vocat. Technol. Educ.*, vol. 7, no. 2, pp. 139–151, 2017, doi: 10.17509/invotec.v7i2.6290.

[16] D. Rizki Tiara and E. Pratiwi, "Mengukur Kesiapan Guru Sebagai Dasar Pembelajaran Daring Di Lembaga PAUD," *J. Golden Age*, vol. 4, no. 02, pp. 362–368, 2020, doi: 10.29408/jga.v4i02.2624.

[17] N. H. Waryanto and W. Setyaningrum, "E-Learning Readiness In Indonesia : A Case Study In Junior High School Yogyakarta," *Int. Semin. Innov. Math. Math. Educ. 1st ISIM-MED*, pp. 645–654, 2014.

[18] D. Aydin, Cengiz Hakan; Tasci, "Measuring Readiness for e-Learning: Reflections from an Emerging Country," *Educ. Technol. Soc. v8 n4 p244-257 2005*, vol. 8, no. 4, pp. 244–257, 2005, [Online]. Available: Educational Technology & Society, v8 n4 p244-257 2005.

[19] D. Hendarwan, "Menumbuhkan Jiwa, Perilaku dan Nilai Kewirausahaan Dalam Meningkatkan Kemandirian Bisnis," *Mbia*, vol. 17, no. 2, pp. 59–68, 2019, doi: 10.33557/mbia.v17i2.345.

Authors Information

Siti Mariah
Universitas Sarjanawiyata Tamansiswa
Batikan St., Tuntungan, Umbulharjo, Yogyakarta
Contact :
E-mail Address: siti.mariah@ustjogja.ac.id

Anggri Sekarsari
Universitas Sarjanawiyata Tamansiswa
Batikan St., Tuntungan, Umbulharjo, Yogyakarta

Ika Wahyu Kusuma Wati
Universitas Sarjanawiyata Tamansiswa
Batikan St., Tuntungan, Umbulharjo, Yogyakarta