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Determinant of the Study Period for Mathematics Education Students at IAIN Bukittinggi Based on CHAID Method

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ABSTRACT

The study period of study program graduates is one of the accreditation assessments carried out by The Independent Accreditation Agencies for Education or LAMDIK. The graduates have a study period is less than five years getting the highest point in the assessment matrix for criterion 9, namely tri-dharma outputs and achievements. However, most study program graduates from various universities in Indonesia completed their studies more than 4 years. This case also happened to graduates of Mathematics Education at IAIN Bukittinggi. There were 70% of graduates who completed their studies more than 4 years. The aim of this research was to determine factors that influence the graduates' study period and their characteristics who were able to complete their studies for 4 years. This research was descriptive quantitative with a correlation study of 10 independent variable factors that affect the study period. By using total sampling, there were 340 graduates of Mathematics Education as a sample of this research. Documentation and questionnaires were used to collect the data. Then, the CHAID method was used to analyze the data. The result showed that, first, there were 5 independent variables that affect the graduates' study period, namely the period of thesis completion, the gender, the major of high school, the mother's occupation, and the track of university entrance. Second, there were 2 characteristics in which students can complete their studies for 4 years with a confidence level of 74,3%.

Keywords: *Study Period, Mathematics Education Students, CHAID Method*

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INTRODUCTION

The duration of studying to obtain a bachelor's degree is four years for the normal time, and a maximum of seven years (Permenristekdikti No. 44, 2015). The graduates' study period is one of the important criteria to determine the accreditation of a study program and even a university (Akreditasi Perguruan Tinggi Kriteria Dan Prosedur IAPT 3.0, 2019). Most of the university students in Indonesia were not able to complete their studies in a normal time. Even some of them are threatened with dropping out from the university for exceeding the study period. It could be seen from the cases that happened to the graduates in various universities in Indonesia. From 2010 to 2012, there were 30.94% graduates of IPB who completed their studies on time

(Pertiwi et al., 2013). Salmu and Solichin in 2017 state that from 4,332 students who entered in 2012 at UIN Syarif Hidayatullah only 2,631 students graduated on time (Salmu & Solichin, 2017). The low rate of graduation timely also happened in other universities such as STIKOM in Bali (Suniantara & Rusli, 2017), UNJ in Jakarta (Pratiwi et al., 2016), UNAND in Padang (Rahmi & Yozza, 2020a), and many others.

There are various factors that affect students are not able to complete their studies for 4 years. It becomes an interesting topic for most education experts in various countries. Razak et al state that the factors that affect students' study period are the teaching and learning process, the level of education of parents, the social environment and economic conditions of students (Razak et al., 2019). In South Africa, economic condition is the main factor of the high rate of dropping-out (Letseka, 2007). In addition, Parwati claimed that there were two factors that cause students did not graduate their studies on time in Indonesia, they were internal and external factors. The internal factors were physiological and psychological factors. Physical conditions greatly determine students' achievement, and unhealthy physical causes the students do not do well their studies. Psychological factors are motivation, interests, talents and intelligence as well as methods and study habits. Meanwhile, external factors include higher education institutional factors such as facilities and infrastructure, teaching and learning process; and environmental factors, such as family, university and community (Parwati et al., 2018). Winkel added that those internal and external factors affect each other (Winkel, 2004). Furthermore, the selection of major or study programs (Rahmi & Yozza, 2020a), gender, GPA, and duration of thesis completion (Padmini et al., 2012), the track of university entrance also affect the length of students' study period (D. Samekto et al., 2014).The case of this study period also found at IAIN Bukittinggi especially graduates of Mathematics Education of Tarbiyah and Teaching Training Faculty (FTIK). Based on the data, most of them obtained their bachelor's degree was more than 4 years. It could be seen in the following table.

Table 1. Study Period of Mathematics Education Students of FTIK IAIN Bukittinggi

Class Year	**Total Of Students**	**Persentage**	
		< 4 years	**> 4 years**
2011	65	23,08 %	76,92%
2012	99	26,26 %	73,74 %
2013	156	21,79 %	78,21 %

From the data of the table above, it could be concluded that more than 70% of Mathematics Education Graduates had a study period of more than 4 years. Based on the results of interviews with several graduates, there were some factors that cause the delay in completing their studies. First, they re-took some subjects to upgrade their previous bad grade. Second, some of them chose to study while working because of economic constraints. And the last, some of them could not make a good communication with their supervisor. In addition, the difficulty in completing the thesis was also one of the main obstacles for Mathematics Education graduates (Fitri, 2020; Fitri et al., 2018; Fitri, Aniswita, & Charles, 2019; Fitri, Aniswita, Charles, et al., 2019). Therefore, it needed an analyze to solve those peoblems in order that this study program did not get obstacles for accreditation.

A statistical method is needed to analyze the factors that significantly affect the graduates' study period of Mathematics Education, it is CHAID (Chi Square Automatic Interaction Detection) method. This method was introduced by Dr. G. V Kass in 1980 in

an article entitled "An Exploratory Technique for Inverstigating Large Quantities of Categorical Data" in the book Applied Statistics (Kass, 1980). The CHAID Method is commonly known as the Classification Tree Method. The main steps of this method were to divide the data into smaller groups based on the relationship between the dependent variable and the independent variable. Then, select and arrange the independent variables based on the level of significance of the dependent variable. CHAID analysis is very effective if the data used were large and the variables were categorical variables. Categorical variables were variables that labeled according to observations and allocated to one of several possible categories, for example blood type O, A, B, AB. (Everitt & Skrondal, 2010).The CHAID Method had some advantages, such as it was faster to use than other methods, the tree diagram formed by CHAID was not limited to binary splits. The nodes and branches generated by CHAID were based on the result of the contingency table, so that the nodes in the tree diagram were interconnected or related. (Robert Nisbet, John Elder, 2009). In addition, the presentation of the result of this method was in the form of a tree diagram so that it is interesting and easier to interpret. Therefore, this research used the CHAID method to analyze the factors that influence the study period of mathematics education students at IAIN Bukittinggi, and to determine the students' characteristics who have a great opportunity to graduate their studies on time.

Many studies have analyzed the factors that affect students' study period by using the CHAID method. First, Lembang and Fendjalang in 2015 with the title of Classification of Determinants of Graduation of FMIPA Unpatti Students Using the CHAID Method used 3 independent variables, namely majors, GPA and gender. The result of study showed that in 4 segments with the 2 most significant variables, namely majors and GPA with the classification accuracy of the CHAID method formed by 85%(Lembang & Fendjalang, 2015). Second, Lestari in 2016 did a research entitled the CHAID Method and Its Application in Classification of Factors Affecting Student Study Period with a case study of UNM MIPA alumni. The research used 5 independent variables such as gender, GPA, school origin, place of origin and entrance university. The result of the study was female students have a high chance of graduating on time (Lestari, 2016). Third, Suniantara and Rusli in 2017 conducted a research for students of STMIK-STIKOM Bali Information System Study Program. The independent variables of the research were gender, study program, length of thesis, GPA, 6th semester IP and college entrance exam scores. The study found that 5 classifications influenced students' study period there were the length of the thesis completion period, GPA, 6th semester IP and study program. In addition, this study also compared the results of the CHAID classification with the binary logistic regression method, where the accuracy of the CHAID classification results was better than binary logistic regression method (Suniantara & Rusli, 2017). And the last, Hasanah and Rahmati with their research entitled Analysis of the timeliness of graduation for FKIP students at the Islamic University of Malang Based on Competency Mastery using the CHAID classification, this study analyzed the characteristics of students who graduated on time and not by using competency variables controlled by students; both hard and soft skills competencies. The results of this study found that the students who had high competence in mastering disciplines, the ability to work under pressure, general knowledge, critical thinking and good English language skills had the opportunity to complete their studies less the same four years (Hasana & Rahmati, 2022).

Considering to the explanation of previous studies above, it could be concluded that the independent variables used to estimate the factors that influence the student's study period were related to the students' cognitive competencies such as GPA, duration of thesis completion, admission to universities and several other cognitive competencies, both hard and soft skills of students, including the gender of students. The difference of this research among the previous researches above was this research added several other variables that were significantly affect the student's study period by considering to the condition of mathematics education students at IAIN Bukittinggi, the variables were (1) Gender of Academic Supervisor, the role of academic supervisor determine fast or slow the students in completing their studies on time in an effective and efficient ways (Tambusai, 2019), (2) father's work and mother's work, this variables was chosen as one of the representations of the student's financial condition which is one of the non-intellectual factors that important in the learning process, that is stated by Satiman et al (Srinadi & Nilakusmawati, 2020), (3) The student's residence while completing their studies, this variable is stated by Wahyu. One of the external factors that causes the length of students' study period is they really enjoy freedom because they are far from their parents, in this case students who have a rent-house as a place to live (Srinadi & Nilakusmawati, 2020) and (4) the order of choosing a mathematics education major at the time of filling out the entry form to IAIN Bukittinggi, is in accordance with the results of research by Rahmi and Yozza where the order of majors chosen illustrates student interest in the department, thus affecting the study period (Rahmi & Yozza, 2020b). By adding these variables, the analysis of the factors that influence the study period of mathematics education students becomes more comprehensive.

METHOD

This research used descriptive quantitative with a correlation study of the factors that affected the study period of mathematics education students at IAIN Bukittinggi. This research used total sampling to choose the sample, that was all graduates of the mathematics education study program of FTIK IAIN Bukittinggi who had registered from the graduation 1st period to the 8th period, there were 340 graduates.

The variables used in this research were the study period (MS) as dependent variable and there were 10 independent variables that could be seen in the following table. There were two categories the study period (MS) was as category I was less than or equal to 4 years and category II was more than 4 years.

Table 2.The Categories of Independent Variable

Number	Variable Name (Notation)	Type	Categori
1	Grade-Point Average (IPK)	Ordinal	1:3,51-4,00 2: 2,76 - 3,50 3:2,00-2,75
2	Gender of the students (JKM)	Nominal	1: Male 2: Female
3	The allocated time to finish thesis (MPS)	Nominal	1:≤ 6 months 2: > 6 months
4	Gender of academic supervisor (JKPA)	Nominal	1: Male 2: Female
5	Residence (TT)	Nominal	1: With parents 2: With other family

			3: Cost or contract 4: ets
6	Father's Job (PA)	Nominal	1: Civil Servant 2: Entrepreneur 3: Farmer 4: Laborer 5: etc 6: already dead
7	Mother's Job (PI)	Nominal	1: Housewife 2: Civil Servant 3: Farmer 4: Entrepreneur 5: death
8	Major in High School (JAS)	Nominal	1: Natural Science 2: Sosial Science 3: etc
9	College Entrance (JM)	Nominal	1: SPAN PTKIN (Invitation) 2: UMPTKIN (College Entrance Examination) 3: College Entrance Self Selection
10	Order (UP)	Nominal	1: First Choice 2: Second Choice 3. Thirth Choice

The documentations and questionnaire distributed to 340 students were used to collect the data. Then, the data were analyzed by using the CHAID method. The algorithm CHAID method consisted of three steps, there were merging, splitting and stopping (Kunto & Hasana, 2006). The description of the CHAID algorithm as follows as:

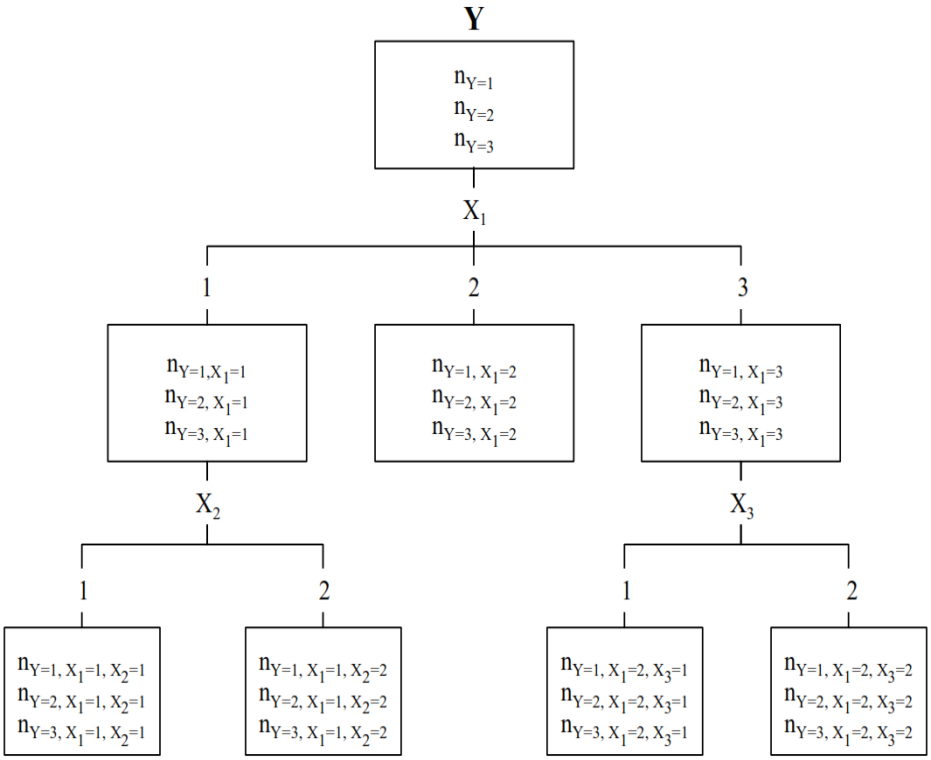
a. Merging
   Step 1. For each independent variable, create cross-tabulate the categories of independent variable with the categories of dependent variable.
   Step 2. Find the pair of the categories of the dependent variable whose 2 x d sub-table is least significantly different that we know from each chi-square value.
   Step 3. If there are non-significant pairs, then among the most similar pairs (with the smallest p-value) merge them as a single category and proceed to step 4
   Step 4. The new category was checked for significance by the chi-square test, then if that pairs are not significant then repeat step 3.
   Step 5. Calculate Bonferoni's corrected p-value.
b. Splitting
   This step aimed to select the independent variable used for the best point division, it was the independent variable which had the smallest Bonferroni corrected p-value with small value or equal to α, otherwise the division is not performed. Next return to the merging step to determine the category significant independent variable best on the subgroups formed.
c. Stopping
   Tree chart growth was stopped when:
   1) All subgroups have been analyzed.
   2) If there was no significant independent variable.
   3) All subgroups had a small or equal of data to the set minimum.

4) The tree diagram formed has reached the set depth level.

(Gallagher et al., 2000; Kunto & Hasana, 2006)

The results of the CHAID method were illustrated in a tree diagram as shown in Figure 1. According to Myers, the tree diagram that formed based on the rules from top to bottom, starting from the parent node then to the subgroups or child node and so on until the groups had no more branches or terminal node. (Kunto & Hasana, 2006)

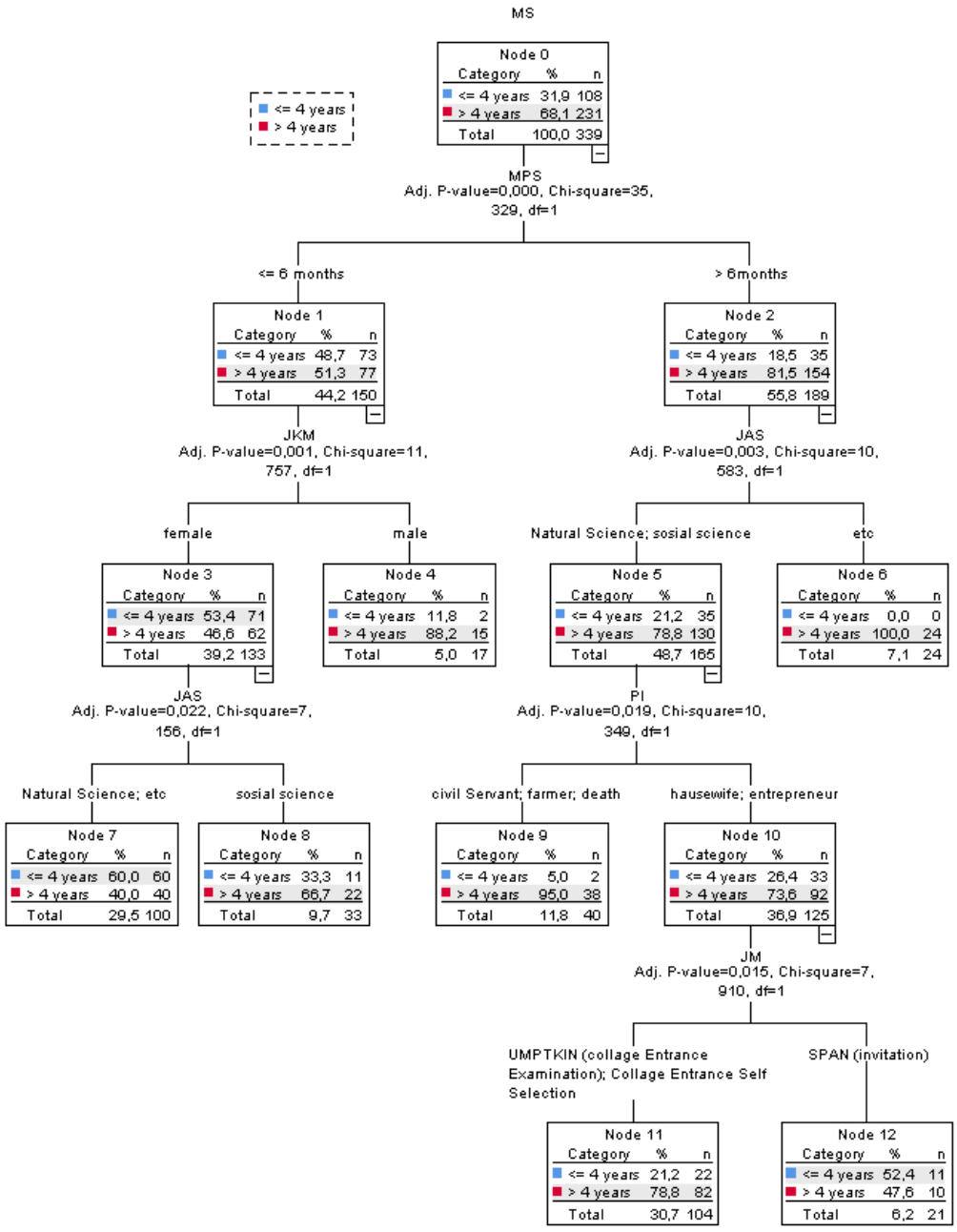
Figure 1. Tree Diagram of the CHAID Method



RESULT AND DISCUSSION

The results of data analysis by using the CHAID method on the variables that affect the students's study period were presented in the tree diagram in Figure 2. Based on Figure 2, it could be showed that there were 5 independent variables that significantly affected the student's study period. These five variables started from the most closely influenced to the weakest there were: (1) Timeline of thesis completion (MPS), (2) Gender of the students (JKM), (3) Major in High School (JAS), (4) Mother's Job (PI) and (5) Track of University Entrance (JM).

Figure 2. Tree Diagram of CHAID Classification Graduation Time For Mathematics Education In IAIN Bukittinggi



Moreover, the result of data analysis by using CHAID method also found seven characteristic types of mathematics education students at IAIN Bukittinggi along with the estimated time for each graduation. The result could be seen in Table 3. From the 7 characteristic types of mathematics education students, there were two types who had opportunity to complete their studies timely, it was less than or equal to 4 years. They were mathematics education students that the timeline of their thesis completion was less than or equal to 6 months, they were female and their major from the high school was science or other (other than social studies major); and mathematics education students that the timeline of their thesis completion was more than 6 months (> 6 months), they came from science or social studies majors in high school, their mothers worked as housewives or entrepreneurs, and the track of their university entrance that they chose was National Academic Achievement Selection of State Islamic Religious Universities or abbreviated as SPAN-PTKIN.

Tabel 3. Characteristics and Estimates of Graduation Time for Mathematics Education IAIN Bukittinggi Students

Group	End Node	Characteristic	Estimates of Graduation Time
1	4	Mathematics education students with a thesis completion period of less than or equal 6 months (≤ 6 months) and male.	> 4 years
2	6	Mathematics education student with a thesis completion period of more than 6 months (> 6 months) and majoring in high school origin in other categories (except science and social studies)	> 4 years
3	7	Mathematics education student with a thesis completion period of less or equal to 6 months, famle and having a major from the school of science or other (other than social studies major)	≤ 4 years
4	8	Mathematics educatin student with a thesis completion period of less or equal to 6 months (≤ 6 months), female and majoring in social studies from high school.	> 4 years
5	9	Mathematics education student with a thesis completion period of more than 6 months (> 6 months), majoring in science or social studies in high school and having a mother who works as a civil servant or farmer or died.	> 4 years
6	11	Mathematics education students with a thesis completion period of more than 6 months (> 6 months), coming from a high school science or social studies major, children of mothers who work as housewives or entrepreneurs and enter higher education through the collage entrance examination (UMPTKIN) or collage entrance self selection	> 4 years
7	12	Mathematics education students with a thesis completion period of more than 6 months (> 6 months), coming from a high school science or social studies major, children of mothers who work as housewives or entrepreneurs and enter higher education through the invitations (SPAN)	≤ 4 years

The CHAID classification tree formed to predict the accuracy of study period time. By using CHAID Method, it found that there was 74.3% accuracy in predicting the study period time of mathematics education students that could be seen in Table 4. The accuracy of prediction for the first category was 65.7% where the students could complete their studies timely or less or equal to 4 years, and the second category was 78.4% where the students completed their studies more than four years.

Table 4. The Accuracy of The Prediction Results of Mathematics Education Students Characteristics Classification Based On The Factors That Affect The Study Periode with The CHAID Method

Observed	**Predicted**		
	<= 4 years	**> 4 years**	**Percent Correct**
<= 4 years	71	37	65.7%
> 4 years	50	181	78.4%
Overall Percentage	35.7%	64.3%	74.3%

Based on the results above, there were five factors that significantly affected the study period of mathematics education students at IAIN Bukittinggi, they were the timeline of thesis completion (MPS), gender of the students (JKM), major in school (JAS), mother's job (PI) and the track of university entrance. The most significant variable affected the study period was the length of thesis completion. It was line with the research finding of Wangid and Sugiyanto that the length of study period was caused by the length of time they completed their thesis (Wangid & Sugiyanto, 2013). In addition, the research that conducted by Hujjatusnaini also found that the length of thesis completion was the cause of the length of students' study period (Hujjatusnaini, 2022). Furthermore, the second variable is the gender of students. The result was in line with the research by Jajuli in 2015 and Padmini et al in 2012 (Jajuli, 2015; Padmini et al., 2012). Related to this variable in mathematics studies, Santrock stated that men were slightly better than women in science and math. In general, the competence of women were the same as men in science and math, but men had abstractions better than women that made men were better than women in mathematics because mathematics contains a lot of abstract meaning (Santrock, 2007). Moreover, Hedges and Nowell found that males slightly outperformed than females in the tests of mathematics and social studies (Ghasemi & Burley, 2019). The third variable was major in school. The students who chose the same major with in high school when they registered in university was predicted passing their studies early or they could graduate timely. This result was line with the research of Srinadi and Nilakusumawati where the students' major in high school was a determinant the students' competence to gain the advanced materials in mathematics (Srinadi & Nilakusmawati, 2020). Indirectly, this factor also affected students' study period. The fourth variable was mother's job. According to Davis-Kean from the University of Michigan, parental income had a positive relationship with student's achievement (Davis-Kean, 2005a). Then, Mustikasari and Mardapi stated that this variable also affected the student's study period (Mustikasari & Mardapi, 2013). The last variable was the track of university entrance. Based on the finding of the research that conducted by Annur et al, the track of university entrance is a variable that greatly affected the study period of FMIPA UPI students (Annur et al., 2015). In addition, Samekto et al claimed that students

who registered by regular way had a higher chance of graduating on time than non-regular students (S. Samekto et al., 2014).

By using CHAID Method, it also found seven characteristic types of students who completed their studies in university. The first type was the gender of mathematics education students was male, although in several studies showed that the men were smarter than women in math (Nosek et al., 2002), but based on the finding of Nicole Else-Quest, the women have good ability in math like the men when they were given the right education and had female role models excelling in mathematics (Else-Quest et al., 2010). At IAIN Bukittinggi, the lecturers of mathematics education were dominated by female that could be the role models for mathematics students so that the female students dominated graduates of mathematics education. Only 11.8% male students graduated their studies on time. This characteristic was in line with the finding of Annur et al, where the probability of graduating on time for male students tends to be lower than female students (Annur et al., 2015). In addition, the research that conducted by Lestari found that female students were able to complete their studies on time (Lestari, 2016). Types 2 and 3 were the students with a thesis completion period more than 6 months and their majors in high schools were other categories (not science dan social studies), and female sudents were able to complete their studies in a normal time and their major was social studies. Both of those types had factor that greatly affected the student's study period that was students' majors in high school except science. This result was line with the research finding of Marsh in 1987, an important factor that may affected students' ability was they worked in a peer group (Elsner et al., 2021). This ablity was origal come from when they were in high school. They will be more motivated when they have relevant major in university. The 4th characteristic of mathematics education students at IAIN Bukittinggi was the students who had the opportunity to graduate less or equal to 4 years, they completed their thesis more than 6 months, their major in high school was a science or social studies majors, and their mothers' jobs were a civil servant and farmer, some of them passed away. This factors may affect students' study period. However, in some studies, the mothers who were busy in working almost in all day affected ther children' cognitive development (Lombardi & Coley, 2017; Ruhm, 2008). Then, the busy mothers will gave the impact to the direct verbal interaction between mothers and ther children, and also affected their childrens' cognitive competence (Weisleder & Fernald, 2013). According to Davis-Keas, the intense communication between parents and children facilitate the parents to develop their childrens' cognitive competence, share about the childrens' hope and dreams for their education and future, and encourage their children to face their problems during learning process (Davis-Kean, 2005b). The next characteristic was the students with a long thesis completion period, then they major was relevant when they were in high school, their mothers had flexible time in working, and they entered the university through the university entrance examination (UM-PTKIN). This characteristic was emphasized on the type of entrance to university that affects the students' study period. This was line with the research findings of Djudin in 20, there was a significant difference in the average length of study for students in terms of the track of university entrance (Djudin, 2018). There were three track of university entrance for undergraduate programs in Indonesia, namely namely SNMPTN or SPAN PTKIN (invitation way), SBMPTN or UMPTKIN and other test selection (Peraturan Menteri Pendidikan Dan Kebudayaan Republik Indonesia Nomor 6 Tahun 2020 Tentang Penerimaan Mahasiswa Baru Sarjana Pada Perguruan Tinggi Negeri, 2020). In addition, Djudin stated that the average length of study for students who entered through the SPAN PTKIN was shorter than students

who entered through the other tracks (Djudin, 2018). The students who passed through SPAN PTKIN SPAN or selection based on students' achievements when they were in high school had ability will gave good impact to their achievement when they were in university (Widayat et al., 2019), and encourage them to achieve a good learning outcomes (Sulman et al., 2020) and directly it also affects students' study period. This was in line with this research, in which one of the characteristics of students who have the opportunity to graduate quickly or on time was mathematics education students with a thesis completion period of more than six months, their major was a science or social studies majors while in high school, their mothers worked as housewives or traders/ merchants or entrepreneurs and entered the university through SPAN PTKIN way. Those students had 52.4% chance to graduate in the university fast or in a normal time. The other students' characteristic who completed their studies less or equal to 4 years was female students with the timeline of thesis completion for six months and their major in high school was not social studies major.

The finding of seven characteristics of mathematics education students at IAIN Bukittinggi became the important result of this research. The result could be one of solutions for mathematics education study program to accelerate the students to complete their study in a normal time or less or equal to 4 years because the result gave the study program about the types of students' characteristics who were able to graduate on time. Then, each of these characteristics were a description of the real conditions of students that was different from the characteristics of other universities.

The results of this study were very strategic for both the head of study program and mathematics students because the variable of study period was one of points for criterion 9 to assess the accreditation of study program (Peraturan BAN PT No 2 Tahun 2022 Tentang Instrumen Akreditasi Program Studi Pada Lingkup Kependidikan, 2022). Based on the results of the analysis, there were 5 variables that significantly affected the study period of mathematics education students, such as the length of thesis completion, the gender of the students, the major from high school, the mothers' job and the track of university entrance. Furthermore, there were 2 characteristics of students who had a great opportunity to complete their studies less or equal to 4 years. These results could be a consideration for the head of study program to make a policy that support the characteristics of these students, by selecting the students based on their major in senior high school and increasing the acceptance quota through the track of SPAN PTKIN. Then, the study program could anticipate the causes students who delay to complete their studies such as by motivating students to submit their thesis title immediately, facilitate administration services well, and encouraging students to conduct a research during practical field experience or PPL. Finally, from the economic field, by recognizing the financial constraints of students, the head of study program can make some policies and prioritize students with these criteria. For the mathematics students, the results of this research become meaningful information for them so that they can manage or prepare their strategies to achieve their bachelor degree less or equal to 4 years.

The limitation of this research was the factors that influence the students' study period selected to be independent variables were still limited to the external factors. It could be a reference for further research by involving students' internal factors as additional variables that affect the students' study period, then it is better to involve a large samples to get various information by using CHAID Method.

CONCLUSION

There were some significant factors that affected the study period of mathematics education students at IAIN Bukittinggi, they were the length of thesis completion, gender, major in high school, mothers' job and track of college entrance. The relationship between those factors with the CHAID method found 7 types of students' characteristics of mathematics education FTIK IAIN Bukittinggi, two of them had the opportunity to achieve their bachelor degree less or equal to 4 years by having 74.3% accuracy level in prediction. This research could be as solutions or considerations for the head of mathematics education study program to make policies that can accelerate the students' study period less or equal to 4 years.

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REFERENCES

Annur, M., Dahlan, J. A., & Agustina, F. (2015). Penerapan Metode Multivariate Adaptive Regression Spline (MARS) untuk Menentukan Faktor yang Mempengaruhi Masa Studi Mahasiswa FPMIPA UPI. *Jurnal Eureka Matika*, *3*(1), 135–155.

Akreditasi Perguruan Tinggi Kriteria dan Prosedur IAPT 3.0, Pub. L. No. 3, 4 (2019).

Davis-Kean, P. . (2005a). The influence of parent education and family income on child achievement. *Journal of Family Psychology*, *19*, 294–304. https://doi.org/10.1037/0893-3200.19.2.294

Davis-Kean, P. E. (2005b). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology*, *19*(2), 294–304. https://doi.org/10.1037/0893-3200.19.2.294

Djudin, T. (2018). Analisis Prestasi Akademik Mahasiswa Lulusan Jurusan Pendidikan Mipa Fkip Untan Ditinjau Dari Jalur Masuk (Snmptn, Sbmptn, Mandiri) Dan Program Kuliah (S-1 Reguler, S-1 Percepatan Apk). *Jurnal Pendidikan Matematika Dan IPA*, *9*(2), 76–88. https://doi.org/10.26418/jpmipa.v9i2.25867

Else-Quest, N. M., Hyde, J. S., & Linn, M. C. (2010). Cross-National Patterns of Gender Differences in Mathematics: A Meta-Analysis. *Psychological Bulletin*, *136*(1), 103–127. https://doi.org/10.1037/a0018053

Elsner, B., Isphording, I. E., & Zölitz, U. (2021). Achievement Rank Affects Performance and Major Choices in College. *Jurnal Ekonomi*. https://doi.org/10.2139/ssrn.3841901

Everitt, B. ., & Skrondal, A. (2010). *The Cambridge Dictionary Of Statistics Forth Edition*. Cambridge University Press. https://doi.org/10.1017/CBO9780511779633

Fitri, H. (2020). Klasifikasi Faktor-Faktor Yang Mempengaruhi Masa Penyelesaian Skripsi Mahasiswa Dengan Metode CHAID Di Fakultas Tarbiyah Dan Ilmu

Keguruan IAIN Bukittinggi. *Jurnal Sains Matematika Dan Statistika*, *6*(1), 9–22. https://doi.org/10.24014/jsms.v6i1.9248

Fitri, H., Aniswita, A., & Charles, C. (2018). Analisis Keterkaitan fFaktor-Faktor Masa Penyelesaian Skripsi dengan Metode CHAID. *HOTS Skill Mathematics Education*, *IV*(1), 230–243.

Fitri, H., Aniswita, A., & Charles, C. (2019). Factors of Affecting Thesis Completion By Using CHAID Method Based on Gender. *HUMANISMA Journal Of Gender Studies*, *03*(01), 27–41. https://doi.org/10.30983/humanisme.v3i1.1498

Fitri, H., Aniswita, A., Charles, C., & Dewi, M. (2019). Analysis Of Factors That Influence The Allocated Time To Finish Thesis Of High Capability Students With CHAID Methods In Faculty Of Teacher's Training IAIN Bukittinggi. *BICED*. https://doi.org/10.4108/eai.17-10-2019.2289764

Gallagher, C. A., Monroe, H. M., & Fish, J. L. (2000). *An Iterative Approach To Classification Analysis*.

Ghasemi, E., & Burley, H. (2019). Gender, affect, and math: a cross-national meta-analysis of Trends in International Mathematics and Science Study 2015 outcomes. *Large-Scale Assessments in Education*, *7*(1), 1–25. https://doi.org/10.1186/s40536-019-0078-1

Hasana, S. N., & Rahmati, N. A. (2022). Universitas Islam Malang. *Prosiding Seminar Nasional Matematika, Statitika Dan Aplikasinya*, *2*(0341), 552249.

Hujjatusnaini, N. (2022). Pendampingan Bimbingan Teknis Penyelesaian Tugas Akhir Mahasiswa IAIN Palangkaraya di Masa Transisi Wabah Covid-19. *Journal of Community DEdication*, *2*(2), 57–69. https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf

Jajuli, M. (2015). *Identifikasi faktor-faktor yang mempengaruhi mahasiswa pascasarjana ipb berhenti studi menggunakan analisis chaid dan regresi logistik*. *4*.

Kass, G. V. (1980). An Exploratory Technique for Investigating Large Quantities of Categorical Data. *Applied Statistics*, *29*(2), 119–127. https://doi.org/10.2307/2986296

Kunto, Y. S., & Hasana, S. N. (2006). Analisis CHAID Sebagai Alat BAntu Statistika Untuk Segmentasi Pasar (Studi Kasus pada Koperasi Syari ' ah Al-Hidayah). *Jurnal Manajemen Pemasaran*, *1*(No.2), 88–98.

Lembang, F. K., & Fendjalang, M. (2015). Klasifikasi Variabel Penentu Kelulusan Mahasiswa FMIPA Unpatti Menggunakan Metode CHAID. *Statistika*, *15*(1), 1–6.

Lestari, A. (2016). *Metode CHAID dan Penerapannya Dalam Klasifikasi Faktor-Faktor Yang Mempengaruhi Masa Studi Mahasiswa (Studi Kasus : Alumni Mahasiswa Jurusan Matematika FMIPA UNM)*. UNM.

Letseka, M. (2007). Why students leave: The problem of high university drop-out rates. *Human Scinces Research Council Review*, *5*(June), 8–9.

Lombardi, C. M. P., & Coley, R. L. (2017). Early Maternal Employment and Children's Academic and Behavioral Skills in Australia and the United Kingdom. *Child Development*, *88*(1), 263–281. https://doi.org/10.1111/cdev.12588

Mustikasari, R., & Mardapi, D. (2013). Faktor-Faktor Yang Mempengaruhi Masa Studi Mahasiswa Di Jurusan Pendidikan Seni Tari Fbs Universitas Negeri Yogykarta Factors Affecting the Study Period of the Students' of Department Dance Education Fbs Yogyakarta State University. *Jurnal Evaluasi Pendidikan*, *1*(1), 48–59.

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Math = male, me = female, therefore math ≠ me. *Journal of Personality and Social Psychology*, *83*(1), 44–59. https://doi.org/10.1037/0022-3514.83.1.44

Padmini, I. A. S., Suciptawati, N. L. P., & Susilawati, M. (2012). Analisis Waktu Kelulusan Mahasiswa Dengan Metode CHAID (Studi Kasus : FMIPA Universitas Udayana). *E-Jurnal Matematika*, *1*(1), 89–93.

Parwati, N. N., Suryawan, I. P. P., & Apsari, R. A. (2018). *Belajar dan Pembelajaran*. PT. Raja Grafindo Persada. https://doi.org/10.1017/CBO9781107415324.004

Peraturan BAN PT No 2 Tahun 2022 Tentang Instrumen Akreditasi Program Studi Pada Lingkup Kependidikan, 1 (2022).

Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 6 Tahun 2020 Tentang Penerimaan Mahasiswa Baru Sarjana pada Perguruan Tinggi Negeri, Pub. L. No. No. 6, 1 (2020).

Permenristek No. 44, Pub. L. No. 44, Kemenristekdikti 1 (2015).

Pertiwi, R. A., Indahwati, & Afendi, F. M. (2013). Analisis Chaid Untuk Identifikasi Ketepatan Waktu Lulus Berdasarkan Karakteristik Mahasiswa. *Xplore: Journal of Statistics*, *1*(2). https://doi.org/10.29244/xplore.v1i2.12418

Pratiwi, D. A., Handoyo, S. S., & Murtinugraha, R. E. (2016). Faktor-Faktor yang Mempengaruhi Masa Studi Mahasiswa Pendidikan Teknik Bangunan Universitas Negeri Jakarta. *Jurnal PenSil*, *5*(2), 118–127. https://doi.org/10.21009/jpensil.v5i2.7249

Rahmi, I., & Yozza, H. (2020a). Analisis Kausal Masa Studi Mahasiswa Program. *Jurnal Matematika Sains Dan Teknologi (JMST)*, *21*(1), 22–34.

Rahmi, I., & Yozza, H. (2020b). Analisis Kausal Masa Studi Mahasiswa Program Studi Matematika Universitas Andalas Dengan Menggunakan Metode Cart. *Jurnal Matematika Sains Dan Teknologi*, *21*(1), 22–34. https://doi.org/10.33830/jmst.v21i1.697.2020

Razak, W. M. W. A., Alia Syed Baharom, S., Abdullah, Z., Hamdan, H., Ulfa Abd Aziz, N., & Ismail Mohd Anuar, A. (2019). Academic Performance of University Students: A Case in a Higher Learning Institution. *KnE Social Sciences*, *3*(13), 1294. https://doi.org/10.18502/kss.v3i13.4285

Robert Nisbet, John Elder, G. M. (2009). *Handbook of statistical analysis and data mining applications / . - GW Libraries*. Academic Press. http://findit.library.gwu.edu/item/7801843

Ruhm, C. (2008). Maternal employment and adolescent development. *Lobour Econ*, *15*, 958–983. https://doi.org/10.1016/j.labcco.2007.07.008

Salmu, S., & Solichin, A. (2017). Prediction of Timeliness Graduation of Students Using Naïve Bayes: A Case Study at Islamic State University Syarif Hidayatullah Jakarta. *SenmiBL*, *April*, 701–709.

Samekto, D., Syafrudie, H. A., & Sutrisno. (2014). Kecenderungan Lama Studi Dan Prestasi Belajar Mahasiswa Jalur Reguler Dan Non-Reguler Program Studi Pendidikan Teknik Bangunan. *Teknologi Dan Kejuruan*, *37*(2), 153–166.

Samekto, S., Syafrudie, H. ., & Sutrisno. (2014). Kecenderungan lama studi dan prestasi belajar mahasiswa jalur reguler dan non-reguler program studi pendidikan teknik bangunan. *Jurnal Teknologi Dan Kejuruan*, *37*(2), 153–166.

Santrock, J. W. (2007). *Child Development*. McGraw Hill Companies.

Srinadi, I. G. A. M., & Nilakusmawati, D. P. E. (2020). Analisis Waktu Kelulusan Mahasiswa Fmipa Universitas Udayana Dan Faktor-Faktor Yang Memengaruhinya. *E-Jurnal Matematika*, *9*(3), 205–212. https://doi.org/10.24843/mtk.2020.v09.i03.p300

Sulman, F., Taqwa, M. R. A., Aminah Zb, A. Z., Rafzan, R., & Fikri, A. (2020). The Effect of Mathematical Connections on the Mastery of Probability Material. *Edumatika :*

Jurnal Riset Pendidikan Matematika, *3*(2), 147. https://doi.org/10.32939/ejrpm.v3i2.645

Suniantara, I. K. P., & Rusli, M. (2017). Klasifikasi Waktu Kelulusan Mahasiswa Stikom Bali Menggunakan Chaid Regression – Trees dan Regresi Logistik Biner. *Statistika*, *5*(1), 27–32.

Tambusai, K. (2019). Kebutuhan Akan Penasehat Akademik di Perguruan Tinggi. *Al-Idarah*, *7*(2), 12–24.

Wangid, M. N., & Sugiyanto. (2013). Identifikasi Hambatan Struktural dan Kultural Mahasiswa Dalam Menyelesaikan Tugas Akhir. *Jurnal Penelitian Ilmu Pendidikan*, *6*(2), 19–28.

Weisleder, A., & Fernald, A. (2013). Talking to Children Matters: Early Language Experience Strengthens Processing and Builds Vocabulary. *Psychological Science*, *24*(11), 2143–2152. https://doi.org/10.1177/0956797613488145

Widayat, E., Ardianik, & Kadar, S. (2019). Pengaruh Kemampuan Awal dan Motivasi Belajar Mahasiswa Prodi Pendidikan Matematika FKIP UNITOMO terhadap Indeks Prestasi (IP) ditinjau dari Daerah Asal. *MUST:Journal of Mathematics Education, Science and Technology*, *4*(2), 147–162. https://doi.org/10.30651/must.v4i2.2911

Winkel, W. . (2004). *Psikologi Pendidikan dan Evaluasi Belajar*. PT. Gramedia Pustaka Utama.