Undergraduate students’ motivation and self-regulated learning in learning statistics: female vs male

L M Saija

Faculty of Teachers Training and Educational Sciences
Universitas Advent Indonesia
Kolonel Masturi 288, Parongpong, Bandung Barat 40559

louisemsaija@gmail.com

Abstract. This research aim is to find out the male and female undergraduate student’s motivation and self-regulated learning. The instrument used is the standardized instrument named MSLQ (Motivated Strategies for Learning Questionnaire) from Pintrich and DeGroot. The factors of motivation and self-regulated learning are: Self Efficacy, Intrinsic Factor, Test Anxiety, Cognitive Strategy Use, and Self Regulation. The respondents are 188 undergraduate students from statistics classes, in Universitas Advent Indonesia. The method used in this research is quantitative method with descriptive analysis and the difference between mean analysis. The result shows that averagely the female and male students in Universitas Advent Indonesia have high category in self-efficacy, Intrinsic Value, Cognitive Strategy Use, Self-regulation, and moderate category of Test Anxiety. Overall, the female and male motivation and self-regulated learning are high. Further, it is found that the difference between female and male undergraduate student’s test anxiety is statistically significant, but the other factors: self-efficacy, intrinsic value, cognitive strategy use, and self-regulation, the difference is not statistically significant. As a whole, the difference between female and male undergraduate students’ motivation and self-regulated learning is not statistically significant.

1. Introduction

Male and Female are different since they are created, at least in their physical attributes. Studies were made to see the differences deeper, and recent studies showed that male and female are different in their emotional self-awareness, interpersonal relationship, self regard and empathy, social influence, motivation and value, learning processes, and the way they solve intelectual problems [1] [2] [3] [4]. Though another study found that there is no different between female and students memory recall [5]. Those studies respondents are mostly undergraduate or college students.

Undergraduate students need to improve many factors related to their learning such as attitude towards ICT [6]; retention and attainment [7]; academic writing [8]; and parts of brain used to encode memories, speech, solve certain problems and make decision [3]. These factors are needed for them to reach success in their study in college or university. Other factors which are important for students around the world are motivation and self regulated learning as there were many studies done according to these factors. Several studies were conducted, towards Brazilian preservice student teachers [9], Liberian students [10], Thai students [11], university students in Pakistan [12], Iranian students [13], postgraduate students at the University of Ljubljana [14], University students in Pakistan [15], Malaysia undergraduate students [16] and Indonesian undergraduate students [17]. Findings shows that students motivation can be different from course to course, depending on the students interest towards the course, students performed efficacy in the course, and since the nature of the course are vary, the students learning strategy may vary as well [13].
Motivation plays an important role in the students academic performance, without motivation learning sometimes becomes a constraint/pressure rather than enjoyment, it is an element that leads students’ attitude towards learning [15]. Moreover, Williams and Williams stated that to reach quality education, students motivation is necessary. Teacher who is well trained and dedicated, accurate content, inventive process, who makes learning environment conducive and accessible, are more likely can motivate students, however the students must have their own motivation [18]. There are two types of well-known motivation, the intrinsic motivation and the extrinsic motivation. Intrinsic motivation refers to doing something because it is interesting and enjoyable, while extrinsic motivation refers to doing something because it brings rewards (outcome) or it can avoid punishment [19]. Intrinsic motivation arises from a person, there is no need for external stimuli. For example, students who likes to read, they will search for books for them to read without having to be told. The purpose of an can encourage student intrinsic motivation as well, like as students will learn seriously because they wants to have more knowledge or ability. So, intrinsic motivation can be said to be a form of motivation that starts from the inner urge to gain something important from the activity. Differ from intrinsic motivation, extrinsic motivation comes from outside or from others. This motivation arises with motivation from people who are considered smarter or more successful or older than that person. This motivation arises because someone yearn for something because of someone else’s order. For example, a student must learn because he wants to get good grades from his teacher, not because he wants to get knowledge. The desire to have good grades, the desire to get praise or gift is extrinsic motivation. In learning activity, motivation is needed to make student better and be able to achieve what is desired [20].

Beside motivation, Pintrich and De Groot stated that, self efficacy and test anxiety are motivation components as well [21]. Self efficacy is related to perceiving competence and confidence in class performance. Bandura stated that self efficacy is a personal beliefs or confidence upon his own ability to solve a specific task. While human action to reach success is much dependent to the interaction of his personal thought and the given task, person with low self-efficacy will face a task’s demand as threatening not as challenging and therefore set low objectives for themselves [16]. On the other hand, test anxiety is defined as fear of failing that student feel before taking an examination, and also about cognitive interference on tests. Students with high test anxiety will face a test with fear and not be able to complete the test properly. In like manner, statistics test anxiety is the worry or fear to face statistic test. The statistic anxiety can be worth of statistics, interpretation anxiety, test anxiety, or else. Finding shows that statistics anxiety is quitely common for undergraduate students [22].

Self-regulated learning is a thought of behavior and emotion managing process for students to successfully navigate his learning experiences [23]. It is important because it can bring benefit to the students, not only during their academic life, but for their future professional practice as well [9]. Students self-regulated is measured by their own learning process that is active metacognitively, motivationally, and behaviorally. A self regulated students personally initiate and do efforts to acquire knowledge and skill, rather than relying on the teachers [24]. According to Pintrich and De Groot self regulated learning has two components, the strategy use and the self-regulation [21]. The strategy use meant here is the cognitive strategy, Gagne (1977) stated that it is an internal learning process of control which serves as a way to modify and regulate the learning process. This cognitive strategy deals with the way to learn, remember, convey idea reflexively and analytically [25].

Statistics is one of the important subjects faced by the undergraduate students. Not only undergraduate students majoring in mathematics, but also the undergraduate students from other departments such as: Nursing, accounting, management, physics, and other majors are obliged to learn statistics. Statistics is a required subject for the undergraduate students so that they will be able to know how to collect, present, and analyze the data in their research work and be able to make the decision for their scientific studies as well. At the same time, having the experience in doing research scientifically is important in the undergraduate students that give benefit for them as well [26].

This research intended to find the motivation and self-regulated learning of male and female undergraduate students who are learning statistics in Universitas Advent Indonesia, and to see whether
there are differences between the male and female undergraduate students’ motivation and self-regulated learning.

2. Method
The method used in this research is quantitative method with the descriptive analysis and the difference between means analysis. Descriptive analysis is used to determine the categories for the female and male undergraduate students self-efficacy, intrinsic value, cognitive strategy use, self-regulation, test anxiety, and as a whole, their motivation and self-regulated learning. While in the difference between means analysis is used to find out whether there is a significant difference between female and male undergraduate students self-efficacy, intrinsic value, cognitive strategy use, self-regulation, test anxiety, and on the whole factors of motivation and self-regulated learning. The respondent are 188 undergraduate students (117 female and 71 male) from statistics course classes, in Universitas Advent Indonesia. All analysis are done based on the SPSS Output, since SPSS is used for the data processing.

Instrument used for measuring the students motivation and self-regulated learning is a standardize instrument known as MSLQ (Motivated Strategies for Learning Questionnaire) adopted from Pintrich dan DeGroot [21]. This instrument contains 44 statements with the scale 1 to 7. The respondent write “7” if she or he thinks that the statement is very true for her or him, or write “1” if the statement is absolutely not true for her or him. The statements are divided into 5 factors: Self Efficacy (statement number 2, 6, 8, 9,11,13,16,18,19), Intrinsic Value (statement number 1, 4, 5, 7, 10, 14, 15, 17, 21), Test Anxiety (statement number 3, 12, 20, 22), Cognitive Strategy Use (statement number 23, 24, 26, 28, 29, 30, 31, 34, 36, 39, 41, 42, 44), and Self Regulation (statement number 25, 27, 32, 33, 35, 37, 38, 40, 43).

For the descriptive analysis, in order to have good interpretation towards the motivation and self-regulated learning factors, responses towards each statement in the Questionnaire are divided into 5 categories. The length of each category interval is (7-1)/5 = 1.2, such that the respondent response (X) categories are: Very low (1 ≤ X ≤ 2,2), low (2,2 < X ≤ 3,4), moderate (3,4 < X ≤ 4,6), high (4,6 < X ≤ 5,8), and very high (5,8 <X ≤ 7).

3. Results

3.1. Descriptive analysis
Simple descriptive analysis are made based on the table below.

|               | N  | Minimum | Maximum | Mean | Std. Deviation | Mean per statement |
|---------------|----|---------|---------|------|----------------|-------------------|
| MSL_F         | 117| 104     | 270     | 212.19 | 28.786         | 4.82              |
| SE_F          | 117| 14      | 57      | 43.27 | 8.727          | 4.81              |
| IV_F          | 117| 15      | 62      | 46.23 | 7.845          | 5.14              |
| TA_F          | 117| 4       | 28      | 16.17 | 5.710          | 4.04              |
| CSU_F         | 117| 19      | 88      | 63.79 | 12.001         | 4.91              |
| SR_F          | 117| 21      | 55      | 42.73 | 6.308          | 4.75              |
| MSL_M         | 71 | 110     | 274     | 213.31 | 27.532         | 4.85              |
| SE_M          | 71 | 24      | 59      | 43.46 | 7.393          | 4.83              |
| IV_M          | 71 | 23      | 59      | 46.52 | 6.807          | 5.17              |
| TA_M          | 71 | 4       | 26      | 17.68 | 4.741          | 4.42              |
| CSU_M         | 71 | 21      | 89      | 62.90 | 11.914         | 4.84              |
| SR_M          | 71 | 30      | 55      | 42.75 | 6.478          | 4.75              |
| Valid N (listwise) | 71 |         |         |       |                |                   |
The results show that the 117 female and 71 male undergraduate students have high self-efficacy, high intrinsic motivation value, moderate test anxiety, high cognitive strategy use and high self-regulation in learning statistics. As a whole, both group of respondents in this research, that is the female and male undergraduate students shows high motivation and self-regulated learning in learning statistics.

The finding that the undergraduate students self-efficacy are high can be construed as they have high personal beliefs or confidence to solve statistics tasks which help them to set a high objectives for themselves [15], increased their motivation in learning and lowering their anxiety towards learning task [27]. So, the result in this study is in mutual accord with the result of Tsang study that students with high self-efficacy will also have high intrinsic motivation [27]. Furthermore their high motivation can help them achieve what they desire [19]. The other finding in this study is that both male and female undergraduate students have high self-regulation in learning statistics, which can be caused by their high self-efficacy as well, since cognitive theorists said that self-efficacy is the key variable affecting self-regulation [24]. Nevertheless self-regulation also affect the students self-efficacy and learning strategy [9]. Therefore, the result in this study is in accordance with the other research findings that there is a reciprocal relationship between self-efficacy and self-regulation in learning. The female and male undergraduate students has high self-efficacy, high self-regulation and high cognitive strategy used in learning statistics. Another result found in this study is that the test anxiety of the female and male undergraduate students is high can be construed as they have high personal beliefs or confidence to solve statistics tasks which help them to set a high objectives for themselves [15], increased their motivation in learning and lowering their anxiety towards learning task [27]. Nevertheless if one or both of the population is not normally distributed, non-parametric test is used, that is the Mann-Whitney U test.

3.2. Difference between means analysis
To find out whether the female undergraduate students’ motivation and self-regulated learning are significantly different or not, on each factor or as a whole, and so the difference between means test is used. The difference between mean test used depends on the result of normality and homogeneity tests. If the data populations are both normally distributed, the test used is parametric test, more specifically the student-t difference between test. Nevertheless if one or both of the population is not normally distributed, non-parametric test is used, that is the Mann-Whitney U test.

Results of normality test can be seen in below table.

| Table 2 Normality test | GROUP* | Kolmogorov-Smirnova | Population Normally Distributed |
|------------------------|--------|---------------------|--------------------------------|
|                        | Statistic | df | Sig. |                     |
| MSL                    | 1       | 0.076  | 117  | 0.097               | Yes   |
|                        | 2       | 0.077  | 71   | 0.200*              | Yes   |
| SE                     | 1       | 0.089  | 117  | 0.024               | No    |
|                        | 2       | 0.102  | 71   | 0.066               | Yes   |
| IV                     | 1       | 0.121  | 117  | 0.000               | No    |
|                        | 2       | 0.093  | 71   | 0.200*              | Yes   |
| TA                     | 1       | 0.113  | 117  | 0.001               | No    |
|                        | 2       | 0.165  | 71   | 0.000               | No    |
| CSU                    | 1       | 0.074  | 117  | 0.168               | Yes   |
|                        | 2       | 0.088  | 71   | 0.200*              | Yes   |
| SR                     | 1       | 0.129  | 117  | 0.000               | No    |
|                        | 2       | 0.119  | 71   | 0.015               | No    |

* 1: Female, 2: Male
Homogeneity test is used to see whether the population variances are homogeneity or not, the results can be seen in below table

| Table 3 Homogeneity test |
|--------------------------|
| Levene Statistic | df1 | df2 | Sig. | Population Variances |
|---------------------|-----|-----|------|----------------------|
| MSL                 | 0.078 | 1   | 186  | 0.780                | Homogeny |
| SE                  | 2.474 | 1   | 186  | 0.117                | Homogeny |
| IV                  | 0.444 | 1   | 186  | 0.506                | Homogeny |
| TA                  | 3.965 | 1   | 186  | 0.048                | Not Homogeny |
| CSU                 | 0.062 | 1   | 186  | 0.804                | Homogeny |
| SR                  | 1.755 | 1   | 186  | 0.187                | Homogeny |

According to the normality test results, the difference between means test used for MSL and CSU is two independent sample t-test; but for SE, IV, TA and SR, Mann Whitney Test is used. The significance value of the test results can be seen in below table

| Table 4 Test statistics result |
|-------------------------------|
| Test             | Sig. (2-tailed) |
|-------------------|-----------------|
| MSL               | T - test        | 0.793           |
| SE                | Mann-Whitney U  | 0.802           |
| IV                | Mann-Whitney U  | 0.971           |
| TA                | Mann-Whitney U  | 0.038           |
| CSU               | T -test         | 0.624           |
| SR                | Mann-Whitney U  | 0.996           |

The result shows that the difference between female and male undergraduate students’ self-efficacy, intrinsic motivation value, cognitive strategy use and self-regulation are not statistically significant; while for the test anxiety factor, there is a significant difference between female and male undergraduate students test-anxiety. More further, as a whole, the difference between female and male undergraduate students’ Motivation and Self-Regulated Learning is not statistically significant.

The result in this study that the female students intrinsic motivation are not significantly different from the male students is in line with the result of Saad’s study which showed that gender did not affect students’ motivation significantly [31], or another study in Hongkong which showed that Male and female students intrinsic motivation towards study are not significantly different [32]. It is also in line with the study of D’lima wherein college students are not significantly differ from their report to intrinsic motivation by gender [33]. Another result in this study is the female and male undergraduate students self-regulated learning are not different also in accord with another result of Saad’s study which showed that gender did not affect students learning strategies significantly [31]. Another result which is in line with another study result is about the significant difference between female and male students test anxiety, more specific this result is in line with the result study of Kajavinthan towards university students in Sri Lanka [34].

Not all of this study results in line with another study results. The result that the difference between female and male undergraduate students self-efficacy is not statistically significant is not in line with the findings of Fallon towards Norwegian students [35], nor D’lima research towards students with different ethnic [33] which found that male students have higher self-efficacy than female students. Also the study result that there is no difference in the use of learning strategies between female and male
undergraduate students is not in line with Božinović’s findings that there are gender differences in the use of learning strategies [36].

4. Conclusion

Studies shows that female and male undergraduate students have many differences, but the result in this study shows that statistically there is no significant difference in the undergraduate students motivation and self-regulated learning, as a whole or on the motivation and self-regulated learning factors partially. This result is like another study made in large southern university which shows that female and male undergraduate students memory recall are not different [5]. The finding that the undergraduate students have high motivation and self-regulated learning and there is no significant difference between the male and the female undergraduate students can caused by the undergraduate students, both male or female, know the importance of learning statistics and know some parts of the subjects from the previous study the students got. Moreover, since both undergraduate students, male and female want to increase their academic achievement, specifically in statistics, they tends to have no different motivation and strategy in learning it. Study shows that there is positive and mutual causal relationship between students’ motivation and students’ academic performance [15].

Male and Female undergraduate students motivation and self-regulated learning can be different when they learn new subjects, but when learning the subjects they have known before, though only a part of it, and knowing the importance of learning those subject, they are statistically proven no different. So, it is important for lecturers, not only to teach the subjects/lessons, but also put more emphasis on the importance of learning those subjects.

References

[1] Meshkat M and Nejati R 2017 Does Emotional Intelligence Depend on Gender? A Study on Undergraduate English Major of Three Iranian Universities SAGE Open J. 2017 1
[2] Davies S, Broekema H, Nordling M and Furnham A 2017 Do Woman Want to Lead? Gender Differences in Motivation and Values Psychology 8 27
[3] Zaidi F Z 2010 Gender Differences in Human Brain: A Review Open Anat. J. 2 37
[4] Carli L L 2001 Gender and Social Influence J. Soc. Issues 57 725
[5] Baer A, Trumpeter N N and Weathington B L 2006 Gender Differences in Memory Recall Mod. Psychol. Stud. 12 11
[6] Almarabeh T, Majdalawi Y K and Mohammad H 2016 Internet Usage, Challenges, and Attitudes among University Students: Case Study of the University of Jordan J. Softw. Eng. Appl. 9 577
[7] Jackson, E E L and Armitage 2017 The Challenges and Issues of Undergraduate Student Retention and Attainment in UK Veterinary Medical Education J. Vet. Med. Educ. 44 247
[8] Pineteh A E 2014 The Academic Writing Challenges of Undergraduate Students: A South African Case Study Int. J. High. Educ. 3 12
[9] Ganda D R and Boruchovitch E 2018 Promoting Self-Regulated Learning of Brazilian Preservice Student Teachers: Results of an Intervention Program Frountier Educ. 3 1
[10] Gbollie C and Keamu H P 2017 Student Academic Performance: The Role of Motivation, Strategies, and Perceived Factors Hindering Liberian Junior and Senior High School Students Learning Educ. Res. Int. 2017 1
[11] Vibulphol J 2016 Students’ Motivation and Learning and Teachers’ Motivational Strategies in English Classrooms in Thailand Engl. Lang. Teach. 9 64
[12] Jado S M A 2015 The Effect of using Learning Journals on Developing Self-Regulated Learning and Reflective Thinking among Pre-Service Teachers in Jordan J. Educ. Pract. 6 89
[13] Feiz P, Hooman H A and Kooshki Sh 2013 Assessing the Motivated Strategies for Learning Questionnaire (MSQL) in Iranian students: Construct Validity and Reliability Procedia Soc. Behav. Sci. 84 1820
[14] Rotgans J I and Schmidt H G 2012 The Intricate Relationship Between Motivation and Achievement: Examining the Mediating Role of Self-Regulated Learning and Achievement-Related Classroom Behaviors Int. J. Teach. Learn. High. Educ. 24 197
[15] Afzal H, Ali I, Khan M A and Hamid K 2010 A Study of University Students’ Motivation and Its Relationship with Their Academic Performance Int. J. Bus. Manag. 5 80
[16] Yusuf M 2011 The Impact of self-efficacy, achievement motivation, and self-regulated learning strategies on students’ academic achievement Procedia Soc. Behav. Sci. 15 2623
[17] Ariani D W 2016 Why do I Study? The Mediating Effect of Motivation and Self-Regulation on Student Performance Bus. Manag. Educ. 14 153
[18] Williams K C and Williams C C 2011 Five key ingredients for improving student motivation Res. High. Educ. J. 11 48
[19] Ryan R M and Deci E L 2000 Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions Contemp. educ. Psychol. 25 54
[20] Saed S and Zyngier D 2012 How motivation influences Students engagement: A qualitative study J. Educ. Learn. 1 252
[21] Pintrich P R and De Groot E V 1990 Motivation and Self-Regulated Learning Components of Classroom Academic Performance J. Educ. Psychol. 82 33
[22] Williams A S 2013 Worry, Intolerance of Uncertainty, and Statistics Anxiety Stat. Educ. Res. J. 12 48
[23] Zumbrunn S, Tadlock J and Roberts E D 2011 Encourage Self-Regulated Learning in the Classroom (Metropolitan Educational Research Consortium (MERC): Virginia Commonwealth University)
[24] Zimmerman B J 1989 A Social Cognitive View of Self-Regulated Academic Learning J. Educ. Psychol. 81 1
[25] Suyitno I 2017 Cognitive Strategy Use in Reading Comprehension and its Contributions to Students’ Achievement IAFOR J. Educ. 5 107
[26] Petrella J K and Jung A P 2008 Undergraduate Research: Importance, Benefits, and Challenges Int. J. Exerc. Sci. 1 91
[27] Tsang S K M, Hui E K P and Law B C M 2012 Self-Efficacy as A Positive Youth Development Construct: A Conceptual Review Sci. Word J. 2012 1
[28] Morosanova V I and Fomina T G 2017 Self Regulation as a mediator in the relationship between anxiety and academic examination performance Procedia Soc. Behav. Sci. 237 1066
[29] Ozen O E and Gencel I E 2016 Self-regulation skills and test anxiety of senior high school students Int. J. Psycho-Educ. Sci. 5 94
[30] Cazan A M 2012 Self regulated learning strategies - predictors of academic adjustment Procedia Soc. Behav. Sci. 33 104
[31] Saad M I M, Tek O E and Baharom S 2011 Self-regulated learning: Gender Differences in motivation and learning strategies amongst Malaysian science student Bitara 4 90
[32] Yau H K and Kan M S 2011 Gender Differences on Intrinsic Motivation in Hongkong Higher Education e-J. Organ. Learn. Leadersh. 9
[33] D’Lima G M, Winsler A and Kitsantas A 2014 Ethnic and gender differences in first-year college students’ goal orientation, sel-efficacy, and extrinsic and intrinsic motivation J. Educ. Res. 107 341
[34] Kajavinthan K 2015 Gender Differences in test anxiety among university students in Jaffna, Sri Lanka Int. J. Sci. Res. 4 1398
[35] Fallan L and Opstad L 2016 Student self-efficacy and gender-personality interaction Int. J. oh High. Educ. 5 32
[36] Božinović N and Sindik J 2011 Gender Differences in the use of learning strategies in adult foreign language learners Metodički obzori 6 5