Impact of Metacognitive Awareness on Academic Adjustment and Academic Outcome of the Students

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ABSTRACT
The study aimed to examine the impacts of metacognition and gender on the academic adjustment and academic outcome of the participants. Five hundred twenty two undergraduate and postgraduate male (M = 20.53, SD = 2.06) and female (M = 20.47, SD = 2.00) students served as the participants in the study. Metacognitive Awareness Inventory (Schraw & Dennison, 1994) and Academic Adjustment Scale (Anderson et al., 2016) were employed to measure the metacognitive awareness and academic adjustment of the participants. The results of the study exhibited no gender differences in metacognition and academic adjustment except academic achievement and academic outcome of the male and female participants. The results of the study also evinced that scores on declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, debugging, evaluation components of metacognition and overall metacognitive awareness demonstrated positive correlations with the academic achievements, overall academic adjustment and academic outcome. Contrarily, the scores of planning and evaluation were found to be negatively correlated with the scores of academic lifestyle of the male, female and all the participants. Lastly, the results of the study demonstrated that the scores on declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, debugging, evaluation components of metacognition and overall metacognitive awareness accounted for significant variance in the scores of academic life style, academic achievements, overall academic adjustment and academic outcome. The results of the study have significant implications of for researchers, academicians, laymen, counselors and school psychologists. The limitations and future directions for researchers have also been discussed.

Keywords: Metacognitive Awareness, Academic Adjustment, Academic Outcome

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Metacognition encompasses a set of mental processes which enables people to understand their cognitive behaviors. Recently, metacognition and its related processes have been shown to affect the human performance, functions and behaviors of the individuals in an array of situations including performance in educational setting. Researchers have shown that metacognition enables the individuals to be successful learners, and has been associated with intelligence, decision making and other important cognitive behaviors (Borkowski, Carr & Pressley, 1987; Sternberg, 1986a, 1986b). Previous researchers have shown that metacognition have significant implications not only in academic performance by also other cognitive and metacognitive measures. It has been reported that judgement of learning and judgement of source, two types of metamemory judgements, affect eyewitness performance (Tiwari, 2010a; Tiwari, 2010b; Tiwari, 2010c; Tiwari, 2011b; Tiwari, 2011c; Tiwari, 2011d; Tiwari, 2011e; Tiwari, 2012; Tiwari, 2013; Tiwari, 2015).

Metacognitive awareness refers to higher order thinking which involves active control over the cognitive processes engaged in learning. Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress toward the completion of a task are metacognitive in nature. The metacognition plays a critical role in successful learning and important to study metacognitive activity and development to determine the way the students can be taught to better apply their cognitive resources through metacognitive control.

The concept of metacognition is of recent origin and first used by Flavell (1976). Metacognition refers to the ability to reflect upon, understand, and control one’s learning. Previous accounts of metacognition have distinguished between two major components, including knowledge about cognition and regulation of cognition (Brown, 1987; Flavell, 1987; Jacobs & Paris, 1987). Knowledge about cognition includes three sub-processes that facilitate the reflective aspect of metacognition: declarative knowledge (i.e. knowledge about self and about strategies), procedural knowledge (i.e. Knowledge about how to use strategies) and conditional knowledge (i.e. knowledge about when and why to use strategies). Regulation of cognition includes a number of sub-processes that facilitate the control aspect of learning. Five component skills of regulation have been discussed extensively, including planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation (Artzt & Armour-Thomas, 1992; Baker, 1989).

The concept of metacognition has studied in many areas like education, entrepreneurship, mathematics, psychology, technical education, abnormal psychology, intelligence, academic performance, metamemory, learning disabilities, teaching competences etc. The concept of locus of control has studied in many areas like personality, stress, depression, self-esteem, achievement motivation, academic achievement, self efficacy, job satisfaction, positive psychology (well-being etc.) management / organizational science, social psychology etc.
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Metacognition is important in learning and is a strong predictor of academic success (Dunning, Johnson, Ehrlinger & Kruger, 2003; Kruger & Dunning, 1999). Kurtz and Borkowski (1984) and others (Biggs, 1985; Stipek, 1982) suggested a positive relationship between the use of metacognition and academic achievement. This positive relationship suggests that as use of metacognition increases, regardless of the approach, one’s academic average increases. Jacobs & Paris (1987) and Wittrock (1983) claim that the use of metacognition appears to be related to academic achievement and enhanced learning outcomes. Watkins and Hattie (1992) reported that students of high academic achievement tend to utilize strategies congruent with their own motivational states more than lower achieving students. Maqsud (1997) investigated the effects of metacognitive skills and nonverbal ability on academic achievement of high school pupils. He found that metacognitive ability tends to associate positively with academic attainment of high school pupils.

Rahman et al. (2010) investigated the impact of metacognitive awareness on performance of students in chemistry with a sample of grade x students. Findings indicated that metacognitive awareness was significantly correlated with the performance of students. The highly metacognitively aware science students performed well on the test. The results of the study indicated that metacognition might play an important role in academic achievement of the students. Review of the available literature shown metacognition and academic outcome are positively correlated.

To my knowledge there are very few studies on the relationship between metacognition and academic adjustment in Indian socio-cultural setting. Most of the researches have focused on academic performance but academic adjustment and metacognition are not paid due attention. Researchers have shown that successful academic adjustment reflects students learning behavior and academic performance (Cazan, 2011). The present research attempted to study metacognition as predictors of academic outcome and academic adjustment of the students. In other words, it attempted to see the impact of metacognitive awareness and gender on academic outcome and academic adjustment of the university students. This area of research has been chosen because it has not been investigated before and the present study will be an appreciable contribution to the existing wealth of knowledge on metacognition in relation to academic outcome and academic adjustment of the students. It will also be an important contribution to existing knowledge to the field of educational psychology.

Objectives of the Study
Following were the basic objectives of the study:

1. To study the nature of relationship among metacognition, academic outcome and academic adjustment.
2. To partial out the role of metacognition in predicting the academic outcome and academic adjustment of the participants.
Hypotheses
Following hypotheses were framed to be tested through the data of the present study:-
1. There would no gender difference in mean score of various components of metacognition.
2. The male participant will show higher mean scores on the various components of academic adjustment as compared to female participants.
3. There will be positive correlations among the scores of various components of Metacognition and academic adjustment and academic outcomes of male and female participants.
4. The metacognition and its components will account for significant variance in academic outcome and academic adjustment.

METHODOLOGY
Population and Sample
The present research endeavor employed a correlational research design. The convenient sampling method was employed to select the participants. 522 undergraduate and postgraduate male (M = 20.53, SD = 2.06) and female (M = 20.47, SD = 2.00) students served as the participants. The biographic details of the participants were obtained through scales and inventory. The participants with age range from 17 to 28 years were allowed to take part in the study.

Tools
Following psychometric tools will be employed in the present study:
1. Metacognitive Awareness Inventory (MAI): A standardized instrument Metacognitive Awareness Inventory (MAI) designed by Schraw & Dennison (1994) was used in the study to assess the metacognitive awareness of the participants. The MAI instrument consists of 52 statements to which participants will respond by marking a Likert scale with numbers from 1 (“not at all true of me”) to 5 (“very true of me”). The statements represent two component categories of metacognition, knowledge and regulation. The knowledge component covered declarative knowledge (knowledge about self and strategies), procedural knowledge (knowledge about strategy use), and conditional knowledge (when and why to use strategies). The regulation component covered planning (goal setting), information management (organizing), monitoring (assessment of learning and strategy), debugging (strategies to correct errors) and evaluation (analysis of performance and strategy effectiveness). The test-retest reliability of this scale is 0.95.
2. Academic Adjustment Scale: This scale measured academic adjustment of the students. This academic adjustment scale was designed by Anderson et al. (2016). The academic adjustment scale represents three dimensional construct of academic adjustment which is academic lifestyle, academic achievement and academic motivation. This scale comprises 9 items. Responses are elicited on five point scale. The test-retest reliability of this academic adjustment scale is 0.84.
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3. **Academic Outcome**: Percentage of marks or grade point average (GPA) of last semester was chosen as the parameter for academic outcome of the students.

**Procedure**
The data collection for the study was started after the collection of the scales and sample. Various scales were administered and the scoring was carried out as per the guidelines depicted in their manuals. The raw score so obtained was arranged as per the design of the study. When the task of data collection completed, the same were treated with the help of SPSS (Statistical Package for the Social Sciences), a software program to analyze the data. The means, standard deviations (SDs), correlations and regression analysis were computed.

**RESULTS**
Metacognition consists of knowledge and regulation components. The knowledge component covered declarative knowledge, procedural knowledge and conditional knowledge. The regulation component covered planning, information management, monitoring, debugging and evaluation. Likewise, academic adjustment consisted of three components viz., academic lifestyle, academic achievement and academic motivation. The results showed that male participants scored higher mean score on declarative knowledge (Male-M = 29.45, SD = 4.71; Female-M = 29.15, SD = 4.50; t = .73, df = 520, p = .469), conditional knowledge (Male-M = 19.72, SD = 3.04; Female-M = 19.49, SD = 3.01; t = .88, df = 520, p = .381), planning (Male-M = 27.50, SD = 4.33; Female-M = 27.43, SD = 4.37; t = .19, df = 520, p = .846), monitoring (Male-M = 26.09, SD = 3.95; Female-M = 25.84, SD = 3.95; t = .71, df = 520, p = .594), and debugging (Male-M = 18.99, SD = 2.97; Female-M = 18.86, SD = 3.04; t = .53, df = 520, p = .594) as compared to their female counterparts.

**Table 1: Mean, SD and t Scores of metacognition and its components of male and female participants.**

| S.No | Metacognition              | Gender | Mean | SD   | t    | df  | p     |
|------|----------------------------|--------|------|------|------|-----|-------|
| 1    | Declarative Knowledge      | Male   | 29.45| 4.71 | .73  | 520 | .469  |
|      |                            | Female | 29.15| 4.50 | .80  | 520 | .425  |
| 2    | Procedural knowledge       | Male   | 14.60| 2.77 | .80  | 520 | .425  |
|      |                            | Female | 14.79| 2.52 | .80  | 520 | .425  |
| 3    | Conditional Knowledge      | Male   | 19.72| 3.04 | .88  | 520 | .381  |
|      |                            | Female | 19.49| 3.01 | .88  | 520 | .381  |
| 4    | Planning                   | Male   | 27.50| 4.33 | .19  | 520 | .846  |
|      |                            | Female | 27.43| 4.37 | .19  | 520 | .846  |
| 5    | Information Management     | Male   | 37.83| 5.14 | 1.71 | 520 | .088  |
|      |                            | Female | 38.58| 4.60 | 1.71 | 520 | .088  |
| 6    | Monitoring                 | Male   | 26.09| 3.95 | .71  | 520 | .480  |
|      |                            | Female | 25.84| 3.95 | .71  | 520 | .480  |
| 7    | Debugging                  | Male   | 18.99| 2.97 | .53  | 520 | .594  |
|      |                            | Female | 18.86| 3.04 | .53  | 520 | .594  |
| 8    | Evaluation                 | Male   | 22.93| 3.62 | .30  | 520 | .765  |
|      |                            | Female | 23.03| 3.82 | .30  | 520 | .765  |
| 9    | Overall Metacognitive      | Male   | 197.12| 21.94| .02  | 520 | .986  |
|      | Awareness                 | Female | 197.15| 21.61| .02  | 520 | .986  |
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On the other hand, female participants demonstrated higher mean scores on procedural knowledge (Male-M = 14.60, SD = 2.77; Female-M = 14.79, SD = 2.52; t = .80, df = 520, p = .425), information management (Male-M = 37.83, SD = 5.14; Female-M = 38.58, SD = 4.60; t = 1.71, df = 520, p = .088), evaluation (Male-M = 22.93, SD = 3.62; Female-M = 23.03, SD = 3.82; t = .30, df = 520, p = .765) and overall metacognitive awareness (Male-M = 197.12, SD = 21.94; Female-M = 197.15, SD = 21.61; t = .02, df = 520, p = .986) as compared to the male participants. The results show that there were no gender differences in metacognition.

The comparisons of mean scores of academic adjustment and its components of male and females exhibited that the male participants have evoked higher mean scores on academic lifestyle (Male-M = 9.19, SD = 2.33; Female-M = 8.91, SD = 2.25; t = 1.41, df = 520, p = .159), academic achievement (Male-M = 10.48, SD = 2.52; Female-M = 9.86, SD = 2.46; t = 2.80, df = 520, p = .005) and overall academic adjustment (Male-M = 31.94, SD = 4.95; Female-M = 31.28, SD = 4.50; t = 1.57, df = 520, p = .117). On the other hand, the female participants had achieved higher mean scores on academic motivation (Male-M = 12.26, SD = 2.20; Female-M = 12.50, SD = 2.02; t = 1.30, df = 520, p = .196) and academic outcome (Male-M = 62.32, SD = 9.02; Female-M = 64.56, SD = 10.89; t = 2.57, df = 520, p = .010). The results evinced that there were no gender differences in academic adjustment except academic achievement and academic outcome.

Table 2: Mean, SD and t Scores of academic adjustment and its components and academic outcome of male and female participants.

| S. No. | Academic Adjustment | Gender | Mean | SD   | t   | df   | p  |
|--------|---------------------|--------|------|------|-----|------|----|
| 1.     | Academic Lifestyle  | Male   | 9.19 | 2.33 | 1.41| 520  | .159|
|        |                     | Female | 8.91 | 2.25 |     |      |     |
| 2.     | Academic Achievement| Male   | 10.48| 2.52 | 2.80| 520  | .005|
|        |                     | Female | 9.86 | 2.46 |     |      |     |
| 3.     | Academic Motivation | Male   | 12.26| 2.20 | 1.30| 520  | .196|
|        |                     | Female | 12.50| 2.02 |     |      |     |
| 4.     | Overall Academic    | Male   | 31.94| 4.95 | 1.57| 520  | .117|
|        | Adjustment          | Female | 31.28| 4.50 |     |      |     |
| 5.     | Academic Outcome    | Male   | 62.32| 9.02 | 2.57| 520  | .010|
|        |                     | Female | 64.56| 10.89|     |      |     |

The coefficients of correlation among the scores of various components of metacognition and academic adjustment of the male and female participants were computed. The results indicated that there were negative and significant correlations among the scores of planning and academic lifestyle (r = -.120, p = .039) of the males. Conversely, the positive correlations existed among the scores of declarative knowledge, academic achievements (r = .170, p = .003), planning (r = .131, p = .025) overall metacognitive awareness (r = .131, p = .024) of the males. There were positive and significant correlations among the scores of debugging, academic outcome (r = .128, p = .028) of the males participants.
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The results indicated that there were negative and significant correlations among the scores of evaluation, academic lifestyle ($r = -.138, p = .037$) of the female participants. The positive and significant correlations existed among the scores of declarative knowledge, academic achievements ($r = .225, p = .001$), procedural knowledge ($r = .166, p = .012$), conditional knowledge ($r = .179, p = .007$), planning ($r = .276, p = .000$), information management ($r = .167, p = .011$) and monitoring ($r = .144, p = .030$) of the female participants.

There were positive and significant correlations among the scores of overall metacognitive awareness, academic achievements ($r = .234, p = .000$) of the female participants. There were positive and significant correlations among the scores of information management, academic outcome ($r = .189, p = .004$), and debugging ($r = .142, p = .032$) of the female participants.

The results indicated that there were negative and significant correlations among the scores of planning, academic lifestyle ($r = -.101, p = .021$) and evaluation ($r = -.110, p = .012$) of all the participants. The positive and significant correlations existed among the scores of declarative knowledge, academic achievements ($r = .195, p = .000$), procedural knowledge ($r = .126, p = .004$), conditional knowledge ($r = .112, p = .010$), planning ($r = .193, p = .000$), information management ($r = .106, p = .015$) and monitoring ($r = .128, p = .003$), evaluation ($r = .095, p = .000$) and overall metacognitive awareness ($r = .174, p = .000$) of all the participants. There were positive and significant correlations among the scores of declarative knowledge, overall academic adjustment ($r = .106, p = .015$) of all the participants. There were positive and significant correlations among the scores of information management, academic outcome ($r = .141, p = .001$), and debugging ($r = .131, p = .003$) of all the participants.

### Table 3: Gender wise correlation among the components of metacognition, components of academic adjustment and academic outcome

| S. No. | Measures                                      | Gender | Male | Female | Overall |
|-------|----------------------------------------------|--------|------|--------|---------|
|       |                                              |        | $r$  | $p$    | $r$    | $p$    | $r$    | $p$    |
| 1.    | Declarative Knowledge & Academic Life Style   |        | -.066| .261   | .013   | .844   | -.031  | .482   |
|       | Procedural Knowledge & Academic Life Style   |        | -.020| .729   | .006   | .930   | -.012  | .788   |
|       | Conditional Knowledge & Academic Life Style  |        | -.017| .767   | -.062  | .350   | -.034  | .439   |
|       | Planning & Academic Life Style               |        | -.120*| .039  | -.078  | .242   | -.101* | .021   |
|       | Information Management & Academic Life Style |        | -.069| .242   | -.019  | .774   | -.053  | .226   |
|       | Monitoring & Academic Life Style             |        | -.103| .078   | -.023  | .725   | -.067  | .127   |
|       | Debugging & Academic Life Style              |        | -.112| .056   | .004   | .954   | -.060  | .171   |
|       | Evaluation & Academic Life Style             |        | -.087| .137   | -.138* | .037   | -.110* | .012   |
|       | Overall Metacognitive Awareness & Academic Life Style | | -.107| .067   | -.053  | .424   | -.084  | .055   |
| 2.    | Declarative Knowledge & Academic              |        | .003 | .001   | .001   | .000   |        |        |
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| S. No. | Measures                                      | Gender Measures | Male | Female | Overall |
|--------|-----------------------------------------------|-----------------|------|--------|---------|
|        |                                               |                 | r    | p      | r       | p       | r       | p       | r       | p       |
| 1      | Achievements                                  |                 |      |        |         |         |         |         |         |         |
|        | Procedural Knowledge & Academic Achievements  |                 | .108 | .064   | .166*   | .012    | .126**  | .004    |         |         |
|        | Conditional Knowledge & Academic Achievements |                 | .056 | .341   | .179**  | .007    | .112*   | .010    |         |         |
|        | Planning & Academic Achievements              |                 | .131*| .025   | .276**  | .000    | .193**  | .000    |         |         |
|        | Information Management & Academic Achievements|                 | .082 | .160   | .167*   | .011    | .106*   | .015    |         |         |
|        | Monitoring & Academic Achievements            |                 | .112 | .056   | .144*   | .030    | .128**  | .003    |         |         |
|        | Debugging & Academic Achievements             |                 | -.036| .537   | .035    | .598    | -.002   | .959    |         |         |
|        | Evaluation & Academic Achievements            |                 | .080 | .171   | .119    | .074    | .095*   | .030    |         |         |
|        | Overall Metacognitive Awareness & Academic Achievements |         | .131*| .024   | .234**  | .000    | .174**  | .000    |         |         |
| 2      | Declarative Knowledge & Academic Motivation    |                 | .083 | .154   | -.018   | .784    | .040    | .358    |         |         |
|        | Procedural Knowledge & Academic Motivation     |                 | .079 | .174   | -.011   | .868    | .046    | .296    |         |         |
|        | Conditional Knowledge & Academic Motivation    |                 | .038 | .516   | .020    | .761    | .028    | .517    |         |         |
|        | Planning & Academic Motivation                |                 | -.010| .871   | .030    | .652    | .007    | .882    |         |         |
|        | Information Management & Academic Motivation  |                 | .032 | .585   | -.060   | .369    | .001    | .991    |         |         |
|        | Monitoring & Academic Motivation              |                 | .053 | .368   | -.093   | .160    | -.010   | .825    |         |         |
|        | Debugging & Academic Motivation               |                 | .001 | .991   | .097    | .145    | .040    | .366    |         |         |
|        | Evaluation & Academic Motivation              |                 | .003 | .956   | -.045   | .503    | -.016   | .707    |         |         |
|        | Overall Metacognitive Awareness & Academic Motivation |         | .049 | .403   | -.020   | .761    | .020    | .642    |         |         |
| 4      | Declarative Knowledge & Overall Academic Adjustment |       | .093 | .113   | .121    | .068    | .106*   | .015    |         |         |
|        | Procedural Knowledge & Overall Academic Adjustment |     | .081 | .167   | .089    | .183    | .081    | .064    |         |         |
|        | Conditional Knowledge & Overall Academic Adjustment |     | .037 | .526   | .076    | .254    | .055    | .206    |         |         |
|        | Planning & Overall Academic Adjustment         |                 | .006 | .919   | .125    | .059    | .056    | .203    |         |         |
|        | Information Management & Overall Academic Adjustment |       | .024 | .684   | .055    | .407    | .031    | .485    |         |         |
|        | Monitoring & Overall Academic Adjustment       |                 | .032 | .586   | .025    | .707    | .031    | .479    |         |         |
|        | Debugging & Overall Academic Adjustment        |                 | -.071| .226   | .065    | .332    | -.012   | .776    |         |         |

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The regression analyses were computed talking metacognition and its components as predictors and academic adjustment and its components and academic outcome as the criterion. The results showed that declarative knowledge contributed 2.90% to the academic achievements (R² = 2.90%, F (1, 292) = 8.70, \( p = .003 \)) of the male participants. Likewise, planning contributed 1.40%, and 1.70% to the academic lifestyle (R² = 1.40%, F (1, 292) = 4.29, \( p = .039 \)) and academic achievements (R² = 1.70%, F (1, 292) = 5.11, \( p = .025 \)) of the male participants. Similarly, debugging component of regulation of cognition contributed 1.60% to account for the variance in the scores of academic outcome (R² = 1.60%, F (1, 292) = 4.88, \( p = .028 \)) of the male participants. The significant contribution of overall metacognitive awareness is limited only to academic achievements up to 1.70% (R² = 1.70%, F (1, 292) = 5.13, \( p = .024 \)) of the male participants, respectively.

The results showed that declarative knowledge contributed 5.00% to the academic achievements (R² = 5.00%, F (1, 226) = 12.01, \( p = .001 \)) of the female participants. Likewise, procedural knowledge contributed 2.70% to account for the variance in the scores of academic achievements (R² = 2.70%, F (1, 226) = 6.37, \( p = .012 \)) of the female participants. Further, conditional knowledge contributed 3.20% to account for the variance in the scores of academic achievements (R² = 3.20%, F (1, 226) = 7.48, \( p = .007 \)) of the female participants. The significant contribution of planning is limited only to academic achievements up to 7.60% (R² = 7.60%, F (1, 226) = 18.57, \( p = .000 \)) of the female participants. Likewise, information management contributed 2.80%, and 3.60% to the academic achievements (R² = 2.80%, F (1, 226) = 6.37, \( p = .012 \)) of the female participants.
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2.80%, F (1, 292) = 6.52, \( p = .011 \)) and academic outcome (\( R^2 = 3.60\%), F (1, 292) = 8.36, \( p = .004 \)) of the female participants. Similarly, monitoring component of regulation of cognition contributed 2.10% to account for the variance in the scores of academic achievements (\( R^2 = 2.10\%), F (1, 292) = 4.78, \( p = .030 \)) of the female participants. The significant contribution of debugging is limited only to academic outcome up to 2.00% (\( R^2 = 2.00\%), F (1, 226) = 4.68, \( p = .032 \)) of the female participants. Further, evaluation contributed 1.90% to account for the variance in the scores of academic lifestyle (\( R^2 = 1.90\%), F (1, 226) = 4.39, \( p = .037 \)) of the female participants. The significant contribution of overall metacognitive awareness is limited only to academic achievements up to 5.50% (\( R^2 = 5.50\%), F (1, 292) = 13.15, \( p = .000 \)) of the female participants, respectively.

The overall scores of declarative knowledge contributed 3.80%, and 1.10% variance to the scores of the academic achievements (\( R^2 = 3.80\%), F (1, 520) = 20.61, \( p = .000 \)) and overall academic adjustment (\( R^2 = 1.10\%), F (1, 520) = 5.91, \( p = .015 \)) of the participants, respectively. The overall scores of procedural knowledge contributed 1.60%, variance in the scores of only academic achievements (\( R^2 = 1.60\%), F (1, 520) = 6.64, \( p = .010 \)) of the participants, respectively. The overall scores of conditional knowledge contributed 1.30%, variance to the scores of the academic achievements (\( R^2 = 1.30\%), F (1, 520) = 6.44, \( p = .004 \)) of the participants, respectively. The overall scores of planning contributed 1.00%, and 3.70% variance to the scores of the academic lifestyle (\( R^2 = 1.00\%), F (1, 520) = 5.39, \( p = .021 \)) and academic achievements (\( R^2 = 3.70\%), F (1, 520) = 20.15, \( p = .000 \)) of the female participants, respectively.

### Table 4: Coefficient of the regression of the scores of the components of the metacognition as predictor and the scores of the components of academic adjustment and academic outcome as criterion in male and female participants

| Criteria | Male | Female | Overall |
|----------|------|--------|---------|
|         | R    | \( R^2 \) | \( R^2 \Delta \) | F | \( p \) | R | \( R^2 \) | \( R^2 \Delta \) | F | \( p \) | R | \( R^2 \) | \( R^2 \Delta \) | F | \( p \) |
| AL      |      |        |         |   |     |     |        |         |     |     |     |        |         |     |     |
| AA      | .170 | .029   | .029    | 8.70 | .003 | .025 | .050   | 12.006 | .001 | .195 | .038 | .038  | 20.61   | .000 |
| AM      | .083 | .007   | .007    | 2.04 | .154 | .018 | .000   | .07    | .784 | .040 | .002 | .002  | 0.85    | .358 |
| OAAD    | .093 | .009   | .009    | 2.53 | .113 | .121 | .015   | 3.37   | .068 | .106 | .011 | .011  | 5.91    | .015 |
| AO      | .036 | .001   | .001    | 0.37 | .542 | .097 | .009   | 2.14   | .145 | .060 | .004 | .004  | 1.89    | .170 |
| AL      | .020 | .000   | .000    | 0.12 | .729 | .006 | .000   | .01    | .930 | .012 | .000 | .000  | 0.77    | .482 |
| AA      | .108 | .012   | .012    | 3.45 | .064 | .166 | .027   | 6.37   | .012 | .126 | .016 | .016  | 8.40    | .004 |
| AM      | .079 | .006   | .006    | 1.86 | .174 | .011 | .000   | .03    | .868 | .046 | .002 | .002  | 1.09    | .296 |
| OAAD    | .081 | .007   | .007    | 1.92 | .167 | .089 | .008   | 1.79   | .183 | .081 | .007 | .007  | 1.34    | .464 |
| AO      | .016 | .000   | .000    | 0.07 | .790 | .041 | .002   | 0.39   | .535 | .031 | .001 | .001  | 0.50    | .482 |
| AL      | .017 | .000   | .000    | 0.09 | .767 | .062 | .004   | 0.88   | .350 | .034 | .001 | .001  | 0.60    | .439 |
| AA      | .056 | .003   | .003    | 0.91 | .341 | .179 | .032   | 7.48   | .007 | .112 | .013 | .013  | 6.64    | .010 |
| AM      | .038 | .001   | .001    | 0.42 | .516 | .020 | .000   | 0.09   | .761 | .028 | .001 | .001  | 0.42    | .517 |
| OAAD    | .037 | .001   | .001    | 0.40 | .526 | .076 | .006   | 1.31   | .254 | .055 | .003 | .003  | 1.61    | .206 |
| AO      | .038 | .001   | .001    | 0.43 | .513 | .095 | .009   | 2.040  | .155 | .069 | .005 | .005  | 2.48    | .116 |
| AL      | .120 | .014   | .014    | 4.29 | .039 | .078 | .006   | 1.38   | .242 | .101 | .010 | .010  | 5.39    | .021 |
| AA      | .131 | .017   | .017    | 5.11 | .025 | .276 | .076   | 18.56  | .000 | .193 | .037 | .037  | 20.15   | .000 |
| AM      | .010 | .000   | .000    | 0.03 | .871 | .030 | .001   | 0.20   | .652 | .007 | .000 | .000  | 0.02    | .882 |
| OAAD    | .006 | .000   | .000    | 0.01 | .919 | .125 | .016   | 3.60   | .059 | .056 | .003 | .003  | 1.63    | .203 |
| AO      | .033 | .001   | .001    | 0.32 | .574 | .055 | .003   | 0.68   | .410 | .044 | .002 | .002  | 1.01    | .315 |
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| Predictors | Criterion* | Male | Female | Overall |
|------------|------------|------|--------|---------|
|            |            | R    | R²    | R²∆   | F      | p    | R    | R²    | R²∆   | F      | p    | R    | R²    | R²∆   | F      | p    |
| Information Management | AL | .009 | .005 | .005 | 1.38 | 242 | .019 | .000 | .000 | 0.08 | .774 | .535 | .003 | .003 | 1.47 | .226 |
|                  | AA | .082 | .007 | .007 | 1.99 | 160 | .167 | .028 | .028 | 6.52 | .011 | .106 | .011 | .011 | 5.93 | .015 |
|                  | AM | .032 | .001 | .001 | 0.30 | 583 | .066 | .004 | .004 | 0.81 | .361 | .001 | .000 | .000 | 0.91 | .991 |
|                  | OAAD | .024 | .001 | .001 | 9.17 | 684 | .055 | .003 | .003 | 0.69 | .407 | .031 | .001 | .001 | 0.49 | .485 |
|                  | AO | .000 | .008 | .008 | 2.37 | 125 | .189 | .036 | .036 | 8.36 | .004 | .141 | .020 | .020 | 10.48 | .001 |
| Monitoring | AL | .103 | .011 | .011 | 3.13 | 078 | .023 | .001 | .001 | 0.12 | .725 | .067 | .004 | .004 | 2.34 | .127 |
|                  | AA | .112 | .012 | .012 | 3.69 | 056 | .144 | .021 | .021 | 4.78 | .030 | .128 | .016 | .016 | 8.71 | .003 |
|                  | AM | .053 | .003 | .003 | 0.81 | 368 | .093 | .009 | .009 | 1.99 | .160 | .010 | .000 | .000 | 0.05 | .825 |
|                  | OAAD | .032 | .001 | .001 | 0.30 | 586 | .025 | .001 | .001 | 0.14 | .707 | .031 | .001 | .001 | 0.50 | .479 |
|                  | AO | .010 | .000 | .000 | 0.03 | 865 | .057 | .003 | .003 | 0.74 | .389 | .026 | .001 | .001 | 0.34 | .558 |
| Debugging | AL | .112 | .012 | .012 | 3.69 | 056 | .004 | .000 | .000 | 0.01 | .954 | .060 | .004 | .004 | 1.88 | .171 |
|                  | AA | .036 | .001 | .001 | 0.38 | 537 | .035 | .001 | .001 | 0.28 | .598 | .002 | .000 | .000 | 0.91 | .599 |
|                  | AM | .001 | .000 | .000 | 0.01 | 991 | .097 | .009 | .009 | 2.14 | .145 | .040 | .002 | .002 | 0.82 | .366 |
|                  | OAAD | .071 | .005 | .005 | 1.47 | 226 | .065 | .004 | .004 | 0.95 | .332 | .012 | .000 | .000 | 0.08 | .776 |
|                  | AO | .128 | .016 | .016 | 4.88 | 028 | .142 | .020 | .020 | 4.67 | .032 | .131 | .017 | .017 | 9.10 | .003 |
| Evaluation | AL | .087 | .008 | .008 | 2.23 | 137 | .138 | .019 | .019 | 4.39 | .037 | .060 | .004 | .004 | 1.88 | .171 |
|                  | AA | .080 | .006 | .006 | 1.88 | 171 | .119 | .014 | .014 | 3.23 | .074 | .095 | .009 | .009 | 4.72 | .030 |
|                  | AM | .003 | .000 | .000 | 0.01 | 956 | .045 | .002 | .002 | 0.45 | .503 | .016 | .000 | .000 | 0.14 | .707 |
|                  | OAAD | .001 | .000 | .000 | 0.01 | 983 | .024 | .001 | .001 | 0.134 | .715 | .010 | .000 | .000 | 0.06 | .811 |
|                  | AO | .036 | .001 | .001 | 0.38 | 540 | .022 | .000 | .000 | 0.113 | .737 | .005 | .000 | .000 | 0.02 | .902 |
| Overall Metacognitive Awareness | AL | .107 | .011 | .011 | 3.38 | 067 | .053 | .003 | .003 | 0.640 | .424 | .084 | .007 | .007 | 3.69 | .055 |
|                  | AM | .131 | .017 | .017 | 5.13 | 024 | .234 | .055 | .055 | 13.15 | .000 | .174 | .030 | .030 | 16.23 | .001 |
|                  | OAAD | .049 | .002 | .002 | 0.70 | 403 | .020 | .000 | .000 | 0.09 | .761 | .020 | .000 | .000 | 0.22 | .642 |
|                  | AO | .038 | .001 | .001 | 0.43 | 512 | .092 | .009 | .009 | 1.95 | .164 | .060 | .004 | .004 | 1.90 | .169 |
|                  | AM | .032 | .001 | .001 | 0.30 | 584 | .054 | .003 | .003 | 0.67 | .414 | .042 | .002 | .002 | 0.94 | .334 |

*Criterion: (AL= Academic Life Style, AA= Academic Achievement, AM= Academic Motivation, OAAD= Overall Academic Adjustment, and AO= Academic Outcome)*

The overall scores of information management contributed 1.10%, and 2.00% variance to the scores of the academic achievements (R² = 1.10%, F (1, 520) = 5.93, p = .015) and academic outcome (R² = 2.00%, F (1, 520) = 10.48, p = .001) of the participants, respectively. The overall scores of monitoring contributed 1.60%, variance in the scores of only academic achievements (R² = 1.60%, F (1, 520) = 8.71, p = .003) of the participants. The overall scores of debugging contributed 1.70%, variance in the scores of only academic outcome (R² = 1.70%, F (1, 520) = 9.10, p = .003) of the participants respectively. The overall scores of evaluation contributed 0.90%, variance in the scores of only academic achievements (R² = 0.90%, F (1, 520) = 4.72, p = .030) of the participants respectively. The overall scores of overall metacognitive awareness contributed 3.00%, variance in the scores of only academic outcome (R² = 1.70%, F (1, 520) = 16.23, p = .000) of the participants respectively.

**DISCUSSION**

The result evinced that there were no significant gender differences in the mean scores of metacognition and its components such as declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, debugging, evaluation and overall metacognitive awareness. The results are collaterals with the finding of research study by Zulkily, (2006) who found no significant gender differences between females and males in overall metacognition awareness. Not much is known about any
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previous literature that showed clear evidence on gender difference in metacognition. Perhaps more studies need to be done to research on this issue. The mean scores of the male and female participants of academic adjustment and three components also did not show statistical difference except academic achievement and academic outcome.

The scores on declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, debugging, evaluation components of metacognition and overall metacognitive awareness demonstrated positive correlations with the academic achievements, overall academic adjustment and academic outcome as previous research has also reported that successful academic adjustment reflects students learning behavior and in their academic performance Cazan, (2012). Contrarily, the scores of planning were found to be negatively correlated with the scores of academic lifestyle of the male and all the participants. The scores of evaluation parts of metacognition (self regulation) exhibited negative correlations with scores of academic lifestyle of the female and all the participants.

Researcher found positive correlation between metacognitive awareness and academic achievements in this study that support Swanson, (1990) arguments, metacognition is very important in learning and performance of the individuals. The use of metacognitive strategies ignites one's thinking and can lead to more profound learning and improved performance, especially among learners who are struggling (Swanson, 1990).

The results of the study also demonstrated that the scores on declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, debugging, evaluation components of metacognition and overall metacognitive awareness accounted for significant variations in the scores of academic lifestyle, academic achievements, overall academic adjustment and academic outcome.

SUMMARY AND CONCLUSIONS
The major conclusion of the study is that metacognition has abiding role in the determination of academic achievements and academic outcome of the students. The present study did not find gender differences in metacognition of the students. The study also evinced that positive aspects of metacognition (declarative knowledge, procedural knowledge, conditional knowledge, planning, information management, monitoring, debugging, evaluation components of metacognition and overall metacognitive awareness) exhibited mostly significant correlations with the scores of academic achievements, overall academic adjustment and academic outcome whereas the planning and evaluation demonstrated either significant correlations or negative correlations with the scores of academic lifestyle.

Directions for Future Researchers
There are many stake holders to the academic success and academic adjustment of the students. Academic success is not only determined by metacognitive awareness but self-compassion, (Verma & Tiwari, 2017a), personality attributes (Verma & Tiwari, 2017b),
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academic self-concept (Gujare & Tiwari, 2016b; Tiwari, 2011a), mental health symptoms (Gujare & Tiwari, 2016a), emotional intelligence (Tiwari, 2016a) also contribute in shaping it. Positive psychological outcomes and constructs like sustainable behaviors (Tiwari, 2016c); Yogic practices (Tiwari, 2016b), nature of body image (Jain, & Tiwari, 2016a; Jain, & Tiwari, 2016b; Tiwari, & Kumar, 2015), emotion regulation (Tiwari, 2015), self-forgiveness and life satisfaction (Mudgal, & Tiwari, 2015) contribute to life outcomes which, in turn, impact human performance including academic success and adjustment. Future researchers must involve these mentioned variables to develop deeper understanding of the dynamics of academic success and academic adjustment of the students. The use of qualitative methods and mixed method would also come up with new findings and will enlighten the dynamics of academic success.

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REFERENCES

Anderson, J. R., Guan, Y., & Koc, Y. (2016). The academic adjustment scale: Measuring the adjustment of permanent resident or sojourner students. International Journal of Intercultural Relations, 54, 68-76.

Artzt, A. & Armour-Thomas, E. (1992). Development of a cognitive-metacognitive framework for protocol analysis of mathematical problem solving in small groups. Cognition and Instruction, 9, 137-175.

Biggs, J. B. (1985). The role of metaleaming in study processes. British Journal of Educational Psychology, 55, 185-212.

Borkowski, J., Carr, M., & Pressely, M. (1987). "Spontaneous" strategy use: Perspectives from metacognitive theory. Intelligence, 11, 61-75.

Brown, A. L. (1987). Metacognition, executive control, self-regulation, and other more mysterious mechanisms. In F. E. Weinert & R. H. Kluwe (Eds.), Metacognition, motivation, and understanding (pp. 65-116). Hillsdale, New Jersey.

Cazan, A. M. (2012). Self Regulated Learning Strategies are Predictors of Academic Adjustment. Journal of Procedia-Social and Behavioral Sciences, 33, 104-108.

Dunning, D., Johnson, K., Ehrlinger, J., & Kruger, J. (2003). Why people fail to recognize their own incompetence? Current Directions in Psychological Science 12, 3, 83-87.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In Resnick (Ed.), The Nature of Intelligence (pp. 231-235).

Flavell, J. H. (1987). Speculations about the nature and development of metacognition. In F. E. Weinert & R. H. Kluwe (Eds.), Metacognition, Motivation and Understanding (pp. 21-29). Hillside, New Jersey: Lawrence Erlbaum Associates.
Impact of Metacognitive Awareness on Academic Adjustment and Academic Outcome of the Students

Gujare, S. K. & Tiwari, G. K. (2016a). Mental health symptoms predict academic achievement of the female students. *The International Journal of Indian Psychology, Volume 4, Issue 1, No.76, 93-111.*

Gujare, S. K. & Tiwari, G. K. (2016b). Academic self-concept and academic outcome of the graduate students: The mediating role of socioeconomic status and gender. *International Journal of Education and Psychological Research, Volume 4, Issue 5, 1-7.*

Jacobs, J. E., & Paris, S. G. (1987). Children’s metacognition about reading: Issues in definition, measurement, and instruction. *Educational Psychologist, 22,* 255-278.

Jain, P., & Tiwari, G. K. (2016a). Body image satisfaction and Life Satisfaction in HIV/AIDS patients. *The International Journal of Indian Psychology, Volume 3, Issue 2, No.1, 81-90.*

Jain, P., & Tiwari, G. K. (2016b). Positive body image and general health: A Mixed Methods Study. *The International Journal of Indian Psychology, Volume 4, Issue 1, No.76, 33-51.*

Kruger, J., and Dunning, D. (1999) Unskilled and unaware of it: How differences in recognizing one’s own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology 77,* 6, 1121-1134.

Kurtz, B. E., & Borkowski, F. G. (1984). Children’s metacognition: Exploring relations among knowledge, process, and motivational variables. *Journal of Experimental Child Psychology, 37,* 335-354.

Maqsud, M. (1997). Effects of Metacognitive Skills and Nonverbal Ability on Academic Achievement of High School Pupils. *Educational psychology, 17(4)*, 387-397.

Mudgal, S., & Tiwari, G. K. (2015). Self-Forgiveness and Life Satisfaction in People Living with HIV/AIDS. *The International Journal of Indian Psychology, Volume 3, Issue 1, No.10, 101-108.*

Rahman, F. U., Jumani, N.B., & Chaudry, M. A. et al. (2010). Impact of Metacognitive Awareness on Performance of Students in Chemistry. *Journal of Contemporary Issues in Education Research, Vol.3, No.10,* pp. 39-44.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19,* 460-475.

Sternberg, R. J. (1986a). Inside intelligence. *American Scientist, 74,* 137-143.

Sternberg, R. J. (1986b). *Intelligence applied.* New York: Harcourt Brace Jovanovich, Publishers.

Stipek, D. (1982, January). *Motivating students to learn: A lifelong perspective.* Paper presented at The Student’s Role in Learning of the National Commission on Excellence in Education, San Diego, CA.

Swanson, H. L. (1990). Influence of metacognitive knowledge and aptitude on problem solving. *Journal of Educational Psychology, 82(2),* 306-314.

Tiwari, G. K. (2010a). Personality and recall accuracy of witnessed events. *Perspectives in Psychological Researches, 33 (1),* 225-231.
Impact of Metacognitive Awareness on Academic Adjustment and Academic Outcome of the Students

Tiwari, G. K. (2010b). Personality differences in source-monitoring of witnessed details. *Anusilana, XXIX*, 65-70.

Tiwari, G. K. (2010c). Research in eyewitness memory: Issues and challenges. *Jigyasa, III (4)*, 66-71.

Tiwari, G. K. (2011a). Academic self-esteem, feedback and adolescents’ academic achievement. *Anusilana, XXXVII*, 15-22.

Tiwari, G. K. (2011b). Arousal differences in recall and source-monitoring accuracy of witnessed events. *Indian Journal of Social Science Researches*, 8(1-2), 29-35.

Tiwari, G. K. (2011c). Personality and metamemory judgements in witnessed events. *United Journal of Awadh Scholars*, 5(2), 23-30.

Tiwari, G. K. (2011d). Stress and human performance. *Indo-Indian Journal of Social Science Researches*, 7 (1), 40-49.

Tiwari, G. K. (2011e). The eyewitness suggestibility effect and source-attribution. *Jigyasa, IV (1)*, 413-418.

Tiwari, G. K. (2012). The misinformation effect and fate of witnessed minutiae. *Indian Journal of Community Psychology*, 8 (1), 134-142.

Tiwari, G. K. (2013). Emotional suppression and eyewitness memory. *JIGYASA, VI (4)*, 196-203.

Tiwari, G. K. (2014). Body image satisfaction enhances self-esteem. *VAICHARIKI, IV (4)*, 7-11.

Tiwari, G. K. (2015). Chronic Physical Illness Affects Emotion Regulation Process: A Case of HIV/AIDS. *The International Journal of Indian Psychology, Volume 3, Issue 1, No.8*, 158-166.

Tiwari, G. K. (2015). Does judgement of learning predict accuracy of recall during emotional arousal? *Madhya Bharati*, 68 (1), 175-190.

Tiwari, G. K. (2016a). Mediating role of emotional intelligence in academic achievement of the graduate students. *The International Journal of Indian Psychology, Volume 4, Issue 1, No.74*, 49-59.

Tiwari, G. K. (2016b). Yoga and mental health: An Underexplored relationship. *The International Journal of Indian Psychology, Volume 4, Issue 1, No. 76*, 19-31.

Tiwari, G. K. (2016c). Sustainable Behaviors and happiness: An Optimistic Link. *The International Journal of Indian Psychology, Volume 4, Issue 1, No. 75*, 127-136.

Tiwari, G. K., & Kumar. S. (2015). Psychology and body image: A review. *Shodh Prerak*, 5(1), 1-9.

Verma, Y. & Tiwari, G. K. (2017a). Self-Compassion as the Predictor of Flourishing of the Students. *The International Journal of Indian Psychology, Volume 4, Issue 3*, 10-29.

Verma, Y. & Tiwari, G. K. (2017b). Relative dominance of Sattva and Tamas Gunas (qualities) makes a difference in self-compassion and human flourishing. *International Journal of Education and Psychological Research, Volume 6, Issue 2*, 67-74.

Watkins, D. & Hattie, J. (1992). The motive-strategy congruence model revisited. *Contemporary Educational Psychology*, 17, 194-198.
Impact of Metacognitive Awareness on Academic Adjustment and Academic Outcome of the Students

Wittrock, M. (1983). *Students' thought processes*. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 297-314). New York: Macmillan Publishing Company.

Zulkiply, N. (2006). Metacognition and its relationship with students' academic performance. In: *National Student Development Conference (NASDEC) 2006, 8-9 August 2006, Kuala Lumpur, Malaysia.*

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