

Examining Understanding and Knowledge of Time Management Perception for the Architectural Education in the United States*

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Abstract

This research has acquired preliminary information about the existing conditions and understanding of members regarding time management for members in the architectural field. The goal of this research is to construct a basis for the time management education framework in architectural field in the future. This research mainly focuses on following questions based on limited objectives: Do groups of academics and professionals have understanding and knowledge of time management? Can the level of an individual's scheduling techniques be correlated to the patterns of knowledge and understanding of time management principles and practices? Can the time management practice status in individual's working environment be correlated to the patterns of knowledge and understanding of time management principles and practices? Can an individual's self-confidence level be correlated to the patterns of knowledge and understanding of time management principles and practices? Data have been collected through comprehensive questionnaires given to academics and professionals in United States. By means of statistical analysis, the hidden patterns, deficiencies and relationships in attitudes about time management have been revealed. The statistical analysis has produced conclusions that, among several subdivisions, self-discipline and planning have strong relationships and confidence, personal organization, control, and information gathering subdivisions have certain relationships with objectives of time management education in this research.

Keywords : Time Management, Architectural Practice, Architectural Education, Design Process, Schedule Management, Self-confidence

1. INTRODUCTION

According to Oglesby, Parker, and Howell (1989) the performance level between architecture, engineering and construction (AEC) fields to carry out a building design and construction project may be measured by productivity, timeliness, and quality. The fact that performance in the architecture field has been given little consideration in either professional practice or academia caused problems. Only recently, some researchers and practitioners in the architectural field have become aware of the importance of the performance related issues which have already been studied in many other fields: Quality-oriented trends in design-build (Blyth 1995), time and cost constraints on the design process (Savage et al. 1988), and time devoted to design in an educational environment (Clayton 2000) were the only few studies in this manner.

Even experienced architects occasionally have difficulty in conducting supervisory and executive responsibilities (Williams 1996). Amongst many supervisory tasks, research studies primarily agreed that time management is essential for successful project management (Kerzner 1992). In both professional practice and academia, ineffective time management causes failure to complete timeliness requirements and to satisfy the preferred level of quality in projects. However, studies of a time management for the architectural field are extremely hard to find and have not received enough consideration.

This research sought to obtain the essential information about the existing conditions and understanding regarding time management from the members of the architectural field including academics and professionals to construct a basis for the time management education framework in architectural field in the future.

2. PURPOSE OF STUDY

Conventionally, time management is not addressed in an architectural curriculum, even though educators and professionals have both agreed that there exists the need for time management capability. For instance, many educators in architectural schools frequently impose time related requirements in their classes, and professionals have constantly experienced time constraints during the design project process.

Broader examinations and applications of time management have already appeared in other fields such as management science, engineering management, and manufacturing management (Kerzner 1992; Helmer 1998). Skoppec and Kiely (1991) suggested general simple steps of time management, such as discovering one's own pattern, goal setting, organizing one's own life, handling interruptions and managing other's time, in order to control one's own life. Mackenzie (1990) proposed several subdivisions in identifying and curing ineffective time use. The definition of time management varies among researchers and disciplines applied. The architectural field may also have a different constitution of subdivisions in its definition and content of time management.

When taking into account the development of time management notions in the architectural field, it is unclear that the architectural field has appropriate grounds on which the notions of time management can be developed. To properly establish the notions of time management and its possible educational framework in architectural terms, the researchers and educators in the architectural field need to investigate previous studies, gather preliminary information, and discover various relationships between time man-

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agement elements and the architectural field, such as current status, needs, essential or effective time management subdivisions, rather than immediately create a time management educational program from other fields. With the basic information, researchers and educators may be able to see the current state of time management and the degree of understanding, experience and knowledge of the notions of time management among the members of the architectural field. Then they may also be able to grasp the profile of techniques and knowledge of time management that might be useful for the architectural field.

The fundamental goal of this time management research is to establish an educational framework of time management in the architectural field in the future. To support this fundamental goal, it is the purpose of present research to provide preliminary information of the current status, the profiles of understanding and knowledge of the members of the architectural field, and noticeable subdivisions for the contents of architectural time management education in the future.

3. BACKGROUND OF STUDY

After World War II, as industrialization and technology required more efficiency and accuracy, a solid concept of time management was established (Douglass and Douglass 1992). As industrial engineering became an imperative force in improving efficiency the time management thoughts were treasured primarily during the 1940's and 1950's. Ever since this noticeable change in the view of time, people have complained about the lack of time. According to Mackenzie (1990), it is not time itself that people are lacking, but rather they lack the concept, techniques and skills to successfully control the time they have on hand. Recent developments in project management coupled with the understanding of its close association to productivity have led many companies to implement some form of project management (Kerzner 1992). Kerzner (1992) argued that strictly controlled time management is one of the most important factors for successful project management.

The notion of time management is not a new concept. And yet, we are still feeling a shortage of time (Mackenzie 1990). The primary reason for problems with time is the practical truth that all the imperatives of time management are generally against the rules of human nature.

Time Management:

Head and Head (1988) argued that time management is, in reality, one of the most important management tools. In general, the project management environment is very unstable, and consists of numerous meetings, report production, conflict resolution, continuous planning and re-planning, communications with the customer, crisis management, and other managerial demands (Kerzner 1992). Consequently, the project manager frequently finds themselves facing difficulty in assigning their time between

numerous supervisory tasks and needs to manage his own time effectively to keep control of the project. Mackenzie (1989) asserted similarly that the biggest reason "goal setters" fail to be "goal getters" is their inability to use time effectively. Skopec (1991) presented two primary steps in improving a person's life with regard to time management. The first step is to discover the patterns which regulate the person's own life. The second step is to create a time budget for each activity.

Schedule Management:

There have been many discussions of schedule and cost control in construction management studies. Callahan et al. (1992) state that, in the construction process, an exceptional schedule can yield as much as 40% cost savings over a reasonable schedule. Conversely, a poor schedule could create overruns of as much as 400%. On average, a poor schedule will produce costs of about 50% more than projects with a reasonable schedule planning effort.

The basic functions of a schedule planning and control system are: setting up realistic activity schedules, monitoring the progress of the schedule, and updating the continuing activity schedule to reflect current and forecasted schedule variances from the beginning to the completion of a project. The primary functions are time analysis and progress measurement. Through the scheduling information system, problems obstructing progress can be detected and eliminated (Popescu and Charoengam 1995).

Callahan et al. (1992) also asserted that an imperative consideration in scheduling and planning is that the schedule should be prepared and developed with input from different management levels. They stated that the involvement, understanding and agreement of all project members should be achieved from the beginning phase of a project. The regular update process at specific time intervals identifies projects or activities that are behind or ahead of schedule, elements impeding the progress, activities causing delay, and so on. They also argued that when distributing the schedule, the information needs to be filtered or summarized specifically for each of the different management levels. Chehayeb and AbouRizk (1998) present a different approach in project planning. They suggest simulation-based scheduling with continuous activity relationships. A little ahead of Chehayeb and AbouRizk (1998)'s suggestion, Senior and Halpin (1998) also suggest a similar approach. They present PICASSO (Project-Integrated Cyclic Analysis of Serial System Operations), which blends and enhances the CPM (Critical Path Method) and a commercial simulation package. CPM is generally accepted as a scheduling and management technique which demands reliable input information in order to be effective (Associated General Contractors of America 1965). CPM consists of essentially three phases; a planning phase, a scheduling phase, and a control-monitoring phase. The planning phase produces five inputs including an arrow diagram, duration estimates per activity, cost estimates per activity, resource estimates, and responsibility indicators. Based on these inputs, the scheduling phase can produce

four outputs, namely a schedule for activities which includes time related information, a bar chart, a resource analysis, and a cash requirement prediction. The control-monitor phase can produce several items including additions, deletions, changes, actual dates, time status reports, revised information, and cost status reports (Associated General Contractors of America 1965).

Management in Architecture:

Birnberg (1999) asserted that effective project management is important to all design firms and to small firms in particular since principals typically make all the decisions and run the projects. He suggested twelve project management problems based on the survey by the Association for Project Managers (APM). Birnberg also argued that although no firm can avoid all problems, effective project management can minimize the impact of many. Head and Head (1988) asserted that an architectural or engineering firm has very unique problems and challenges in organizing proper business and project management controls in order to compete effectively. What makes these firms a special case is that the only product that they can sell is their expertise and creativity translated into time. Thus, they must integrate time and finance into one managerial system (Head and Head 1988). Franklin (2000) argued that management of the precise process, scheduling, accounting, and documentation that leads to production, bidding, and construction is one of three different areas in which architects need to excel to manage a project effectively.

Birnberg (1999) also asserted that although many firms experience the need for skilled project managers, few schools provide even rudimentary management training in their curricula. He argued that many project managers learned the necessary project management skills on the job or through seminars or self-initiative.

4. PREMISES

This research is founded upon some fundamental concepts, terms, premises and assumptions as followings:

Time is the only resource that must be spent the moment it is received, and it should be spent at one fixed rate: sixty seconds per minute, sixty minutes per hour. We can only manage ourselves in relation to time. We can only control how we use it. Time management is not about time in the abstract, but what we can accomplish with time (Mackenzie 1990).

For a project manager, time is more of a constraint. Effective time management principles are required to “convert time from being a restraint to becoming a resource (Kerzner 1992).” However, the major problem with time management is getting people to realize that there exists a time management problem, and that there is room for improvement (Kerzner 1992).

Ideal research should attempt to secure valid inference by means of random assignment, possible cause as treat-

ments, and possible effects of the treatments as outcomes (Cook and Campbell 1979; Creswell 1994). However, since random assignment is more difficult in field settings than laboratory settings, the research might not have total control over the setting and units of assignment. A quasi-experiment, which this research adopted, does not use random assignment to create comparison but depends on non-equivalent groups that differ from each other in many ways (Cook and Campbell 1979).

The categorization and contents of time management in this research were derived from the notions of several researchers such as Kerzner (1992), Mackenzie (1990), Helmer (1998), Lakein (1973), and other key researchers in time management as shown in Table 1. Among many subdivisions that researchers suggested, the ten subdivisions of time management that have been commonly recognized by most of the researchers to be important were extracted and utilized as variables for the purpose of statistical analyses in the present study.

5. QUESTIONS AND HYPOTHESES

Even though many questions might have been suggested, this research was limited to the following four questions:

1. Do groups of academics and professionals have understanding and knowledge of time management in any different pattern?
2. Does the level of an individual’s scheduling technique skill be correlated to the patterns of knowledge and understanding of time management principles and practices?
3. Does the time management practice status in individual’s working environment be correlated to the patterns of knowledge and understanding of time management principles and practices?
4. Does an individual’s self-confidence level be correlated to the patterns of knowledge and understanding of time management principles and practices?

The following null hypotheses were tested by means of statistical formula:

Hypothesis 1: There are certain patterns of time management understanding and knowledge in each group, between groups, or over all groups.

Hypothesis 2: There is meaningful relationship between the certain patterns discovered in hypothesis 1 and the level of scheduling technique exhibited by the participant, such as the use of predecessor – successor diagram, Gantt chart, and CPM.

Hypothesis 3: There is meaningful relationship between the certain patterns discovered in hypothesis 1 and the participant’s work procedures, such as interval of time recording, the ability to share schedules within an organization, and reporting period for progress on a project.

Hypothesis 4: There is meaningful relationship between the certain patterns discovered in hypothesis 1 and the individual’s self-confidence level.

Table 1. Dependent Variables and Subdivisions as Independent Variables

Independent Variable(Subdivision)	Description
Confidence: crisis management	Anticipating what might happen and making plans to prevent it or to reduce its impact (Mackenzie 1990).
Problem finding	Getting people to realize that there exists a time management problem and that solutions are possible (Kerzner 1992).
Planning	Setting priorities for a specific term, doing the most important task first, and giving it full concentration (Mackenzie 1990).
Personal organization	Getting and staying organized by an integrated system and the self-discipline to stay with it (Lakein 1973, Mackenzie 1990).
Self-discipline	Habit to stick with one important job until it is finished (Lakein 1973, Mackenzie 1990).
Socialization	Time and occasions of excess socializing (Mackenzie, 1990).
Communication	Medium in which work gets accomplished with clear purpose, appropriate channel, clear message, clear transmission, and feed back (Lakein 1973, Mackenzie 1990).
Control	Monitoring projects progresses, evaluating performance, and spotting problems promptly (Lakein 1973, Mackenzie 1990).
Information gathering	Organizing needs systematically to guarantee getting the information when it is needed (Mackenzie 1990).
Time management in general	Time management knowledge, with a focus on scheduling and planning in terms of architectural and construction management.
Dependent Variable	
Scheduling technique	The proficiency level of scheduling technique exhibited by participant.
Time management in working environment	Time management practice level in working environment
Self-confidence	The individual degree of self-confidence in time management

6. RESEARCH METHODOLOGY, PROCEDURE AND INSTRUMENTATION

This research, based on the research context, utilized the survey questionnaire as a data collection tool. Data were collected through comprehensive survey questionnaires mailed to academics and professionals in United States.

The survey participants were consisted of two groups. The group of academics as the first group includes The University of Michigan at Ann Arbor and Texas A&M University at College Station. And group of professionals as the second group includes four firms: De Stefano + Partners in Chicago, ADD inc. in Boston, Morris Architects in Houston and Arkitex Studio in College Station. Both groups were voluntarily agreed to participate survey. The first group was assemblies of graduate students in several accredited architectural schools. The second group was composed of experienced architects in professional architectural design companies. Participants in both groups have minimum of a bachelor's degree in architecture or related fields and most of them were not exposed to time management education before. The profiles of participants were shown in Table 2.

The time management survey was conducted from spring 2002 for approximately six months in colleges of architecture and architectural design companies in the southern, eastern, and central part of the United States as described above. The schools mostly provide similar and accredited Bachelor and Master of Architecture programs.

The participants were composed of intern architects and experienced architects in architectural design companies as well as graduate students with the architectural design ma-

ior who already have experienced minimum of one design studio. The participants were recruited by voluntary basis.

Table 2. Demographic Profile of Participants

First Group (Academics)		Second Group (Professionals)	
Status	Status		
Graduate students	30	Architect	31
Gender	Gender		
Male	24	Male	22
Female	6	Female	9
Field of study	Field of study		
Architecture	23	Architecture	29
Business	0	Business	1
Construction	3	Construction	0
Engineering	3	Engineering	0
Other	1	Other	1
Educational background	Educational background		
Bachelor	10	Bachelor	16
Master	19	Master	13
Ph.D.	1	Ph.D.	1
Other	0	Other	1
Time management training experience	Time management training experience		
Once	2	Once	7
Several times	0	Several times	0
No	28	No	24

The survey employed multiple choice questions formatted as 5-point Likert's attitude scales (Belson 1986) and questionnaire was constructed based on previous references from other researchers in time management and management science. Besides subdivisions as main part of survey questionnaire, questions regarding participants' demographic facts, the level of scheduling technique utilization, time management status in working environment, and the level of self-confidence were included to produce dependent variables.

This research was designed to investigate the level of understanding and knowledge of time management in the architectural field. Through statistical analyses, this research investigated which time management subdivisions had greater significant relationships than others in terms of statistical interpretation and then compared the results.

This research was limited to the subdivisions as independent variables, which originated partially from Mackenzie (1990) and other researchers, as described in Table 1. Through statistical analysis and construction of a “good fit (Ott 1993)” regression model, this research sought to find a general pattern of the relationship between the dependent variables and independent variables. In addition, through correlation analysis, this research examined the relationships between the dependent variables and each independent variable to select more meaningful subdivisions for the time management education in architectural field, especially for architectural design students.

The dataset was analyzed by the SPSS® 10.0 for Windows. Descriptive statistics such as the means and standard deviations, and inferential statistics were computed. Then, this research established a model by selecting the appropriate variables that explained as much disparity in performance assessment as possible. Since this research intended to analyze the variances and relationships of multiple independent and dependent variables simultaneously, it was appropriate to use multivariate analysis which is possibly the most useful forms of statistical analysis of this kind (Kerlinger and Lee 2000). The SPSS® 10.0 for Windows was utilized to analyze the data set. Subsequently a statistical stepwise procedure (Ott 1993) was utilized to establish the regression model to reveal significant variables and correlations when necessary.

7. RESULTS

In Figure 1, it was observed that two subdivisions, socialization in time management and time management in general, have relatively lower means. In addition, in Figure 1, the Second Group (Professionals) revealed relatively

higher mean values than the First Group (Academics) in most of subdivisions with a few exceptions. This difference may possibly indicate that the inclusive performance level of Second Group (Professionals) was generally better than First Group (Academics) in time management.

For reliability analysis, the Cronbach coefficient alpha method was utilized due to the size of sample. In each subdivision, the items that were weakening the reliability of original dataset were removed. The subdivisions that did not prove to be reliable were removed as well. In the studies of research questions, two statistical methods were employed. A discriminant analysis (Neter et al. 1996) was conducted to decide whether there was an overall statistically significant difference in the results as well as to reveal which subdivision may predict new observations. For the discriminant analysis the Wilks’ Lambda test (Norman and Streiner 1986) was utilized. In general, when the Wilks’ Lambda value approaches to 1.00, it indicates that the difference of observed mean values between groups becomes statistically inconsequential. Between two groups, the discriminant analysis was conducted and the overall Wilks’ Lambda value was .728. In addition, the characteristics of the questions facilitated the use of the multiple regression model (Neter et al. 1996) to determine which independent variables were correlated and responsible for the statistical significance with each dependent variable (Ott 1993). The correlation coefficient, which is normally expressed by an R-value that varies between -1.00 and 1.00, represents the measure of the relationship between two variables. Subsequently, when it was applicable, the stepwise regression method was used to explore the relationship between dependent variables and selected independent variables. It was employed to analyze the contribution of the independent variables to the variation of the dependent variable.

Research Question 1. Understanding and Knowledge of Time Management in Groups: Groups of academics and professionals have understanding and knowledge of time management in any different pattern?

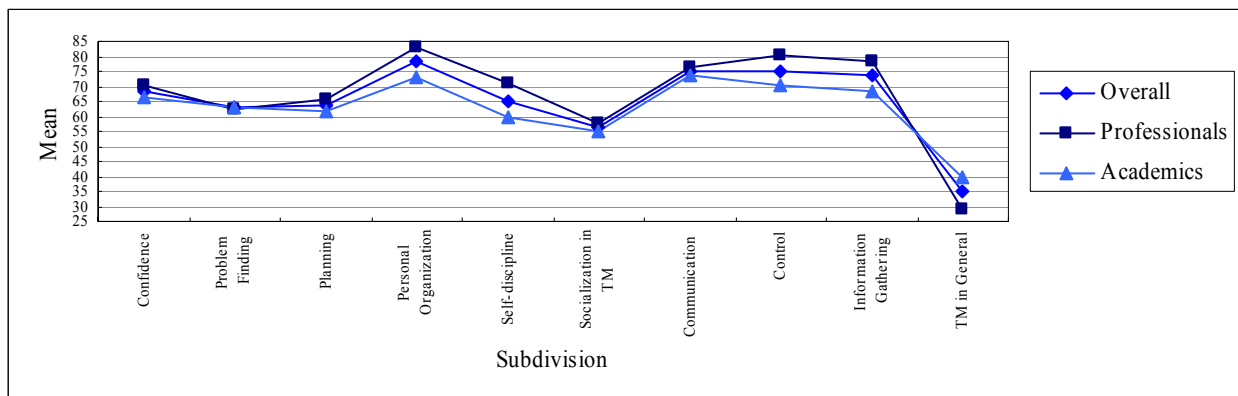


Figure 1. Time Management Survey Means Distribution in Subdivision

Table 3. Means and Standard Deviations of Groups

Subdivisions	First Group		Second Group		Total		Wilks Lambda	Sig.
	M	SD	M	SD	M	SD		
Confidence	64.11	14.98	72.37	14.69	68.31	15.29	.926	.034*
Planning	60.00	12.42	66.00	11.93	63.05	12.45	.941	.059
Personal Organization	67.76	13.30	77.96	11.69	72.94	13.42	.854	.002*
Self-discipline	62.73	9.90	75.22	12.26	69.08	12.74	.756	.000*
Communication	73.50	8.16	76.26	6.93	74.90	7.63	.967	.159
Control	69.94	14.01	80.16	12.82	75.14	14.27	.870	.004*
Information Gathering	68.13	17.83	78.39	10.61	73.34	15.39	.887	.008*

* P < 0.05

The discriminant analysis (Neter et al. 1996) was utilized for this research question. Comparing the means and standard deviations of First Group and Second Group in Table 3 indicated that the mean values in Second Group were higher and the standard deviations were smaller than those of First Group in most subdivisions. The Wilks' Lambda values in subdivisions designates whether there is statistically significant differences between observed mean values between the two groups. It implied that there were equalities in terms of the mean value variance in each subdivision.

The levels of significance in each subdivision are also presented in Table 3. When the level of significance is smaller than 0.05, it can be generally accepted as statistically significant. When this value is bigger than 0.05 and smaller than 0.10, it also can be accepted as marginally significant. In these regards, five subdivisions in Table 3 were statistically significant enough to distinguish one group from another group regardless of the equality in the mean values as described above. The planning subdivision can be accepted as a marginal one.

Research Question 2. Scheduling Technique: The level of an Individual's scheduling technique skill be correlated to the patterns of knowledge and understanding of time management principles and practices?

A multiple regression model was utilized to reveal hidden correlations in this research question. When strong correlation exists between independent and dependent variables, usually the correlation value approaches positive 1.00. In Table 4, the subdivision of self-discipline indicated relatively strong correlation with the scheduling technique measurement.

In Table 5, model 1 and 2 were presented as the results of stepwise analyses by application of self-discipline and planning correspondingly. Usually the equation is finalized

in the final step and applied variables are considered to be the most effective predictors. In this study, however, only the first step was accepted in order to favor a more conservative approach due to the relatively small sample size, although the final step showed a bigger R Square value. Table 5 and Figure 2 show the subdivision of the self-discipline constructed regression relationship with scheduling technique in the first step. In model 1, the significance levels were allowable as well. Figure 2 exhibits the linear regression relationship of self-discipline subdivision and scheduling technique.

Table 4. Correlations and Significance Level between Subdivisions and Scheduling Technique

Subdivisions	Pearson Correlation	Sig.
Confidence	.378	.001*
Planning	.555	.000**
Personal Organization	.490	.000**
Self-discipline	.624	.000**
Communication	.408	.001*
Control	.602	.000**
Information Gathering	.534	.000**

* P < 0.05 ** P < 0.001

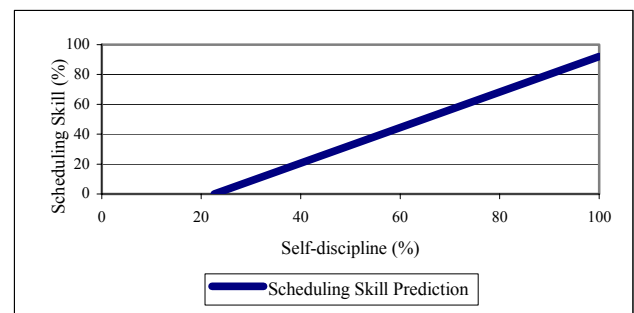


Figure 2. First Step Regression Analysis Chart on Self-discipline Subdivision and Scheduling Technique

Table 5. Coefficients on Stepwise in Subdivisions and Scheduling Technique

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.	R Square
		B	Standard Error	Beta		
1	(Constant)	-26.957	13.611		.052	.390
	Self-discipline Subdivision (F)	1.190	.194	.624	.000*	
	Equation	$y = -26.957 + 1.190 F$				
2	(Constant)	-56.393	14.308		.000*	.518
	Self-discipline Subdivision (F)	.934	.185	.490	.000*	
	Planning Subdivision(D)	.747	.190	.383	.000*	

* P < 0.001

Research Question 3. Time Management Status in Working Environment: The time management practice status in individual's working environment be correlated to the patterns of knowledge and understanding of time management principles and practices?

As shown in Table 6, the Wilks' Lambda values of most subdivisions approached 1.00, which signifies that participants did not exhibit significant variances in mean values in terms of time management practice.

Table 6. Wilks' Lambda and Significance in Time Management Practice

Subdivisions	Time Sheet Use		Calendar Sharing	
	Wilks' Lambda	Sig.	Wilks' Lambda	Sig.
Confidence	.921	.463	.983	.641
Planning	.944	.660	.988	.694
Personal Organization	.859	.128	.886	.030*
Self-discipline	.782	.016*	.879	.024*
Communication	.860	.129	.834	.005*
Control	.898	.297	.920	.090**
Information Gathering	.841	.081**	.923	.097**

* P < 0.05 ** 0.05 < P < 0.10

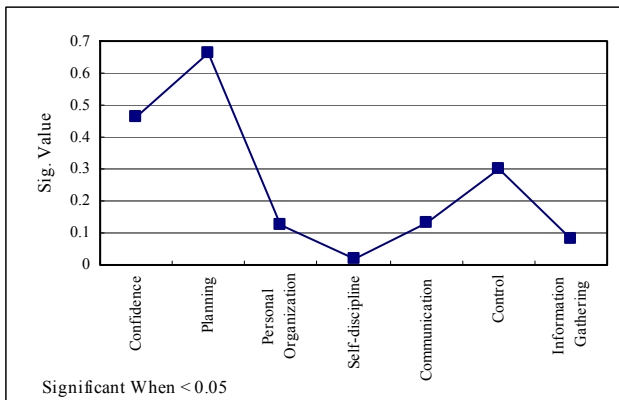


Figure 3. Levels of Significance Chart on Time Management Subdivisions for Time Sheet User Groups

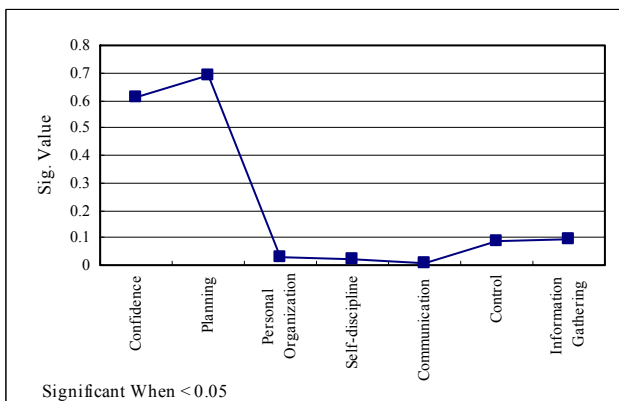


Figure 4. Levels of Significance Chart on Time Management Subdivisions for Calendar Sharing Groups

In Table 6 and Figure 3 and 4, the levels of significance in each subdivision are presented. The self-discipline subdivision was significant in distinguishing one group from another group by time management practice regardless of the mean values. The subdivision of information gathering had marginal significance. Among the participants who make use of calendar sharing, the personal organization and communication subdivisions are significant as a discriminant while the control and information gathering subdivisions are also marginally significant.

Research Question 4. Self-Confidence: An individual's self-confidence level be correlated to the patterns of knowledge and understanding of time management principles and practices?

A regression model was also applied to uncover correlations. As shown in Table 7, three subdivisions revealed relatively strong correlations. The planning subdivision exhibited the strongest correlation with the self-confidence level measurement. It can be observed that the other six subdivisions have positive values as well.

Table 7. Correlations and Significance Level between Subdivisions and Self Confidence

Subdivisions	Pearson Correlation	Sig.
Confidence	.293	.011*
Planning	.424	.000**
Personal Organization	.271	.017*
Self-discipline	.314	.007*
Communication	.386	.001*
Control	.400	.001*
Information Gathering	.341	.004*

* P < 0.05 ** P < 0.001

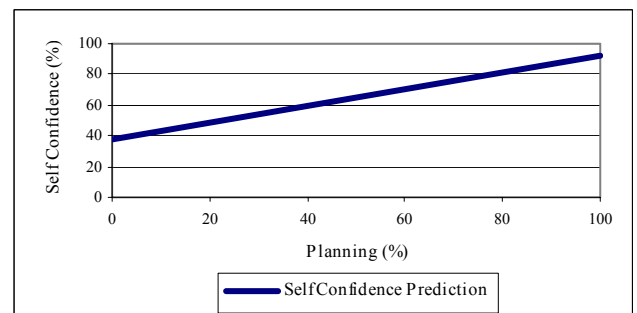


Figure 5. First Step Regression Analysis Chart on Planning Subdivision and Self Confidence

Table 8 presents model 1, which was derived from applying the planning subdivision, which demonstrated the largest correlation value of the seven variables, in stepwise analysis. Similar to Table 5 and Figure 2, due to relatively small sample size, only the first step was accepted in favor of conservative approach. Both significance levels were less than .05 and therefore allowable. The linear regression relationship between planning and self confidence level is shown in Figure 5. This analysis indicated that the subdivision of planning can predict the level of self confidence.

Table 8. Coefficients on Stepwise in Subdivisions and Self Confidence

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.	R Square
		B	Standard Error	Beta		
1	(Constant)	37.147	9.950		.000**	.179
	Planning Subdivision (D)	.556	.155	.424	.001*	
	Equation	$y = 37.147 + .556 D$				
2	(Constant)	-.317	18.736		.987	.250
	Planning Subdivision (D)	.439	.158	.334	.007*	
	Communication Subdivision (H)	.599	.257	.279	.023*	

* P < 0.05 ** P < 0.001

8. DISCUSSIONS

Research Question 1. Understanding and Knowledge of Time Management in Group

The data indicated that there was a noticeable difference in the comparison of mean values, which implied that overall time management knowledge was higher for professionals in spite of distinctly low scores in some indicators. This finding supports the inference that professional experience might lead to some increases in the overall levels of knowledge and understanding in time management. However, in the subdivision of *time management in general*, which represents the planning and scheduling knowledge in terms of construction engineering and management, there was a significant difference in favor of graduate students. It is the opinion of the researcher that classes such as architectural management or practice management may have led to the elevated scores of graduate students in this subdivision. Professional architects who are in managerial positions also achieved relatively higher scores in this subdivision, which suggests that the demands of management responsibility provide motivation for the acquisition of knowledge in time management.

As shown in Table 3, professional architects and graduate students had different levels of understanding and knowledge in the five subdivisions of *confidence, personal organization, self-discipline, control, and information gathering*.

Based on these findings, it is the opinion of the researcher that these five subdivisions should be included in contents of time management education for architectural students.

Research Question 2. Scheduling Technique

The expected answer is that those who are most knowledgeable of time management principles would also make the greatest use of scheduling techniques in daily practice.

As shown in Table 4, the analysis indicated that the participants' level of scheduling technique exhibited a noticeable correlation with the subdivision of *self-discipline*. In Table 5 and Figure 2, the stepwise regression model analysis revealed an increasing linear relationship between the subdivision of *self-discipline* and the level of scheduling technique. Based on these findings, it can be statistically demonstrated that the level of understanding and knowl-

edge in the subdivision of *self-discipline* can predict the level of scheduling technique. In addition, as shown in Table 4, the participants' scheduling technique level had a relatively strong correlation with the subdivisions of *control* and *planning*. Therefore, there is a possibility that, in a slightly different setting, the levels of understanding and knowledge in those subdivisions may be able to predict the levels of scheduling technique.

Based on these findings, it is the opinion of researcher that three subdivisions, *self-discipline, control, and planning*, should be utilized to improve the level of scheduling technique in architectural discipline. In particular, one's scheduling technique level can be improved noticeably when one is most knowledgeable of *self-discipline* subdivision principles.

Research Question 3. Time Management Status in Working Environment

In Table 6, the analyses revealed a relatively clear profile of significance levels. Participants who used time-sheets showed a distinct difference in their level of understanding and knowledge in the subdivision of *self-discipline*. Participants also demonstrated a difference in the level of understanding and knowledge in the subdivision of *information gathering*, among other subdivisions. The discriminating capability of the *self-discipline* subdivision was statistically proven. When taking into the consideration, however, that graduate students infrequently use time tracking medium while professionals generally do in the workplace, the level of validity in this subdivision's discriminating power may be in need of further study.

Participants who shared calendars showed large enough differences in the levels of understanding and knowledge in the subdivisions of *personal organization, self-discipline, communication, control, and information gathering* to discriminate them from the other respondents.

These finding presents the possible assertion that the understanding and knowledge of the *self-discipline* subdivision can leads to the employment of different time management practices in the working environment.

Research Question 4. Self-Confidence

As shown in Table 7, the analysis indicates that the level of understanding and knowledge in the subdivision of *planning* had a noticeable correlation with the level of self-confidence. The level of significance of this correlation

was statistically high. The stepwise analysis began with the subdivision that had the strongest correlation. In Table 8 and Figure 5, the stepwise regression model analysis revealed that the participants' level of self-confidence had an increasing linear relationship with the subdivision of *planning*. However, the model is relatively less predictable probably due to small size of sample. Based on these findings, there is statistical support for the conclusion that the level of understanding and knowledge in the subdivision of *planning* can predict the level of self-confidence. In addition, as shown in Table 7, the participants' level of self-confidence also exhibited relatively strong correlations with the subdivisions of *control* and *communication*. Therefore, there is a possibility that, in a slightly different setting, the levels of understanding and knowledge in those subdivisions may be reasonable predictors of the level of self-confidence in people.

These findings make the assertion possible that the levels of understanding and knowledge in three subdivisions, *communication*, *control*, and *planning*, can improve or have effect on the level of self-confidence. In particular, one's level of self-confidence can be increased when one is most understanding and knowledgeable of *planning* subdivision principles.

9. CONCLUSIONS

The results of the study revealed that there was a significant difference between academics and professionals in five subdivisions. Professionals rated significantly higher in *confidence (crisis management)*, *personal organization*, *self-discipline*, *control*, and *information gathering* subdivisions. These results suggest that professionals demonstrated higher functions in these subdivisions of time management than academics. Although not statistically significant, the results also suggest that the professional group is superior to the academic group in the subdivisions of *planning*, *time management in general*, and *communication*. However, the limitations of measurement should be recognized that the differences between the two groups might be as a result of the way survey participants respond. That is, academics may tend to be more critical of their own performance where professionals may tend to be more self-promoting.

A within-group examination of respondents mean scores on the ten subdivisions of time management suggests that both groups showed similar profiles of scores across the subdivisions. The examination found that both academic and professional groups have relatively better knowledge and performance in the five subdivisions that were identified to be the most significantly different between the groups than in the other five time-management subdivisions which require more attention in construction of time management education contents.

As shown in Figure 1, the study found that both academic and professional groups are most short in the understanding of *time management in general*. The subdivision of *time management in general* consists of items concern-

ing scheduling and planning techniques in construction management field. Therefore, the concepts and skills required for this subdivision may not be familiar to the members of the architectural field. Another important finding regarding the within-group weakness is *socialization in time management* which means both respondent groups socialize less in the framework of time management. Although the data collected in this research were not reliable for analysis, this subdivision should be considered with caution because the terms and concepts of socialization used in time management are unique and are apparently opposite to the general notion of socialization. Although previous literature of management science emphasized the importance of incorporating the notion of socialization used in the study to subdivisions of time management education, the validity and efficiency of this subdivision in the architectural field has not been tested.

Due to the nature of the present study and lack of previous work that investigated the outcome of time management training, the findings of the analysis has many limitations in interpreting and generalization as followings:

- Independent variables of present study were selected mainly by the frequency of appearance in literature and were not fully described in practical manner.
- Survey questions were mainly constructed by the checklists in existing literature and not tested to determine whether these questions can measure what they are intended to measure.
- The number of samples was allowable for a preliminary study but small compared to ordinary statistical analyses.
- The regional distribution of the sample was limited to the eastern, central, and southern parts of the United States.
- There was a lack of time management surveys or education results in other disciplines to compare with.

Followings are additional limitations of present study:

1. Despite increasing recognition of the importance of time management in real architectural practice to improve time efficiency and productivity (Kerzner 1992), a systematic approach has not actually been tried. The present study is the first study to apply time management concepts and theoretical framework to the architectural field.

2. Many researchers and professionals have agreed upon the key role of time management in securing a certain level of performance in project management and asserted that closely controlled time management might result in greater improvements in aspects such as cognitive improvement, affective improvement, and behavioral improvement (Buckley 2000).

3. Although there should be more studies on the determination of time management education framework and its contents, the present study revealed that the five subdivisions have significant relationships with respondents in measurements of efficacy and performance and it might give researchers and teachers a clearer picture and direction in the construction of time management education.

Table 9. Noticeable Subdivisions for the Architectural Time Management Education based on Results of Present Study

Time Management Educational Objectives following each Research Question and Hypothesis	Confidence	Problem Finding	Planning	Personal Organization	Self-discipline	Socialization	Communication	Control	Information Gathering	Time Management in General
<i>Objective 1: Overcome overall differences in understanding and knowledge of time management between professionals and students</i>	●		○	●	●			●	●	
<i>Objective 2: Measure, predict, and improve the level of scheduling technique</i>					●					
<i>Objective 3: Distinguish and improve the status of time management practice in working environment</i>				○	●		○	○	○	
<i>Objective 4: Measure, predict, and improve individual's self-confidence level in usual daily life</i>			●				○	○		

● Primary ○ Secondary

Despite many limitations, the analyses suggested important relationships even though the present study did not include a thorough list of efficiency measures. The results showed the following linear regressive relationships:

- Self-discipline – Scheduling technique
- Planning – Self confidence
- Self-discipline – Time management practice in the working environment

When taking into account four research hypotheses and questions as the precise but partial objectives of time management education in architectural school, the results of present study produce noticeable subdivisions as shown in Table 9 which might be considered as partial detailed contents of time management education.

It would be premature to provide a specific proposal about the whole structure and comprehensive contents of time management education for architectural curriculum at this time, especially when considering that this is only the beginning stage of time management study in the architectural field and also considering the limitations of the hypotheses and questions investigated by the present study. However, as shown in Table 9, these subdivisions can be considered as appropriate ones when researchers and educators construct the contents of time management education in the future. Table 9 shows primary and secondary subdivisions in each precise educational objective as noticeable main subjects of time management education. Detailed contents of each subject might require further study to be adjusted and refined to architectural field even though those are already exist in many other related fields. It is the researcher's intention that the present study might provide a foundation and guide for future time management education study in the architectural field.

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