

# A Preliminary Study on Time Pressure and Procrastination in Undergraduate Industrial Design Students

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**Abstract:** Undergraduate industrial design students face time pressures that may be exacerbated by procrastination. Students are aware that procrastination results in inefficiency, but they still procrastinate when faced with tight deadlines. The purpose of this study is to explore time pressure and procrastination, and the relationship between them, in undergraduate industrial students. Time Pressure and Procrastination questionnaires were distributed among 596 students from seven universities in Taiwan. The findings are summarized as follows: 1) Work Deadline yielded the highest ratio of pressure out of all the pressure factors; 2) Concept Generation was the design task where the most serious student procrastination occurred; and 3) students' time pressures were positively correlated with procrastination.

**Key words:** *Design, education, time pressure, procrastination*

## 1. Introduction

Undergraduates know that procrastination yields bad project or work outcomes, but this behavior may still occur when students are faced with academic pressure [5]. Industrial design students, who also take various knowledge-based courses, study many time-consuming technical and practical subjects that require hands-on operation and practice [4]. Consequently, it is a challenge for industrial design students to manage courses, assignments, leisure activities, and sleep [13]. Whether a student succumbs to procrastination when faced with pressure, which may cause learning difficulties, is an issue worth exploring.

The main purpose of this study is to explore industrial design students' time pressures and the procrastination status of their design core course assignments, as well as the relationship between them. In this study, survey questionnaires about time pressure and procrastination were distributed among university and college industrial design students to collect data for further analysis and exploration.

## 2. Literature Review

### 2.1 Time Pressure

Overwork and time stress are the origins of pressure [3]. Pressure results from differences between demands and values, with greater differences resulting in larger pressures [7, 9]. Students have a limited time for learning at school, but have many courses and activities; each student needs to manage his/her learning time while focusing on specific (core) courses and relegating other less-important courses to the background. Good time distribution helps students to complete their assignments to meet deadlines and to achieve maximum learning efficiency.

Nonis et al. [7] thought that the issue of time management is not that students have too much work, but insufficient time to do what they want to do most. Therefore, students without time management skills may commonly have difficulty completing assignments within a limited time period. Good time management enables students to work more efficiently, complete tasks or goals on time, and do more with the time they have. Macan, Shahani, Dipboye, and Phillips [6] pointed out that undergraduates have a very stressful life, and that time management is the main countermeasure that university and college counseling services frequently recommend. Thus, importance and priority need to be considered when making time management decisions, which then allow students to correspondingly arrange their time and resources. Students must learn to say no when necessary, and postpone tasks that are not an immediate priority. Another good suggestion is using a to-do list to organize, plan, and assign priority to the most important items.

## **2.2 Procrastination**

Procrastination is a personality behavior, in which an individual puts off a matter or task that needs to be done [12]. Klassen et al. [5] pointed out that procrastination is related to such factors as self-discipline, learning effectiveness, self-esteem, and self-regulation. This research showed that students know that procrastination yields adverse results; however, they still do it. Procrastination is not a new phenomenon, and some psychologist's studies show that it relates to other mental aspects [10]. Some students choose procrastination to handle the learning pressures they face; however, the consequences of procrastination and passiveness may lead to fear and failure, as well as unhealthy mental influences or anxiety. Procrastination relates to the self-management of pressure and to the issues of motivation and behavior. In previous literature on time management, procrastination is described as a time-consuming phenomenon, a behavior, and a tendency. Most students have a tendency toward procrastination, and will have anxiety because of it [1].

Industrial design students take many different subjects. The type of learning required for the design subjects are different from the learning required for common subjects; the design subjects require long thought processes and usually have strict deadlines [11]. As a result, a student's time is sometimes fragmented and he or she is not able to use it effectively. This can result in a great deal of pressure, which could lead to procrastination.

In this study, we hope to clarify the degrees of time pressure experienced by students, the status and degree of bother (or consequences) resulting from procrastination due to the varying degrees of time pressure, and students' willingness to improve their procrastination behaviors.

## **3. Method**

This study explores time pressure and procrastination issues among industrial design students, in order to determine whether a causal relationship exists between students' time pressures and procrastination behavior in the process of professional learning. We will also examine the pressure factors, the degree of bother caused by procrastination, and students' willingness to improve this behavior.

### **3.1 Subjects**

We recruited subjects for this study from among industrial design students, from sophomores to seniors, from seven universities in Taiwan: two national universities, two private universities, two national universities of technology, and one private university of technology. A questionnaire survey was used to collect a total of 652 responses; after removing 56 invalid copies, 596 valid questionnaires remained.

### 3.2 Data Collection and Analysis

To measure the time pressures that students face, we adopted the Time Stress Questionnaire proposed by Rothblum, Solomon, and Murakami [8]. The details of the questions are shown in Table 1. The time pressure scale is composed of a total of 32 questions, measured using a 5-point Likert scale, where the 1 point indicates “not bothering,” and the 5 point indicates “always bothering.”

The procrastination evaluation scale was determined by referring to studies related to design education [2]. The questions are divided into five design operation phases (tasks): “design research,” “concept generation,” “design decision,” “design presentation,” and “design documentation.” Each phase contains three questions, including the “procrastination degree,” “degree of bother,” and “willingness to reduce procrastination.” A 5-point Likert scale is used for the questionnaire evaluation scale, where the 1 point of the “procrastination degree” indicates “never procrastinates,” and the 5 point indicates “always procrastinates”; the 1 point of the “degree of bother” indicates “no bother,” and the 5 point indicates “a great deal of bother”; and the 1 point of the “willingness to reduce procrastination” scale indicates “not willing to,” and the 5 point indicates “always willing to.” First, the researchers obtained consent from the target departments and schools to conduct the survey. Then, they either personally distributed the questionnaires using their own personnel or assigned certain faculties or graduate students to assist them. Each questionnaire survey took 20–30 minutes to complete. The responses to the questionnaire were manually keyed into an Excel spreadsheet. After sorting and correcting the collected data, SPSS statistical software was used to carry out the statistical analysis.

Table 1. Time pressure questionnaire

No	Questions
1	My time is directed by factors beyond my control
2	Interruptions
3	Chronic overload—more to do than time available
4	Occasional overload
5	Chronic underload—too little to do in time available
6	Occasional underload
7	Alternating periods of overload and underload
8	Disorganization of my time
9	Procrastination
10	Separating home, school, and work
11	Transition from work or school to home
12	Finding time for regular exercise
13	Finding time for daily periods of relaxation
14	Finding time for friendships
15	Finding time for family
16	Finding time for vacations
17	Easily bored
18	Saying “yes” when I later wish I had said “no”
19	Feeling overwhelmed by large tasks over an extended period of time

20	Avoiding important tasks by frittering away time on less important ones
21	Feeling compelled to assume responsibilities in groups
22	Unable to delegate because no one to delegate to
23	My perfectionism creates delays
24	I tend to leave tasks unfinished
25	I have difficulty living with unfinished tasks
26	Too many projects going at one time
27	Getting into time binds by trying to please others too often
28	I tend to hurry even when it's not necessary
29	Lose concentration while thinking about other things I have to do
30	Not enough time alone
31	Feel compelled to be punctual
32	Pressure related to deadlines

Table 2. Procrastination questionnaire

Tasks	No	Questions
Design research	D1-1	What is your degree of procrastination in your design research work?
	D1-2	What degree of bother in your design research work is caused by procrastination?
	D1-3	What is your willingness to reduce procrastination in your design research work?
Concept generation	D2-1	What is your degree of procrastination in your concept generation work?
	D2-2	What degree of bother in your concept generation work is caused by procrastination?
	D2-3	What is your willingness to reduce procrastination in your concept generation work?
Design decision	D3-1	What is your degree of procrastination in your design decision work?
	D3-2	What degree of bother in your design decision work is caused by procrastination?
	D3-3	What is your willingness to reduce procrastination in your design decision work?
Design presentation	D4-1	What is your degree of procrastination in your design presentation work?
	D4-2	What degree of bother in your design presentation work is caused by procrastination?
	D4-3	What is your willingness to reduce procrastination in your design presentation work?
Design documentation	D5-1	What is your degree of procrastination in your design documentation work?
	D5-2	What degree of bother in your design documentation work is caused by procrastination?
	D5-3	What is your willingness to reduce procrastination in your design documentation?

The original time pressure questionnaire was designed to contain 32 questions; after conducting a factor analysis, it was divided into eight factors, as shown in Table 3; these factors were identified as: Leisure Time (P1), Work Deadline (P2), Disorder Status (P3), Overwork (P4), Instable Workload (P5), Job Responsibility (P6), Situation Change (P7), and Insufficient Time (P8). Statistical analysis revealed the reliabilities of these eight factors to be: Leisure Time 0.843; Work Deadline 0.805; Disorder Status 0.565; Overwork 0.759; Instable

Workload 0.685; Job Responsibility 0.618; Situation Change 0.595; and Insufficient Time 0.396. The total reliability of the complete questionnaire was 0.867.

Table 3. Time pressure reliability scale

No.	Factors							
	P1	P2	P3	P4	P5	P6	P7	P8
14	0.843	0.027	0.083	0.017	0.052	0.063	0.196	0.047
13	0.827	0.098	0.070	0.033	0.015	0.060	0.128	0.006
16	0.787	0.088	0.068	0.102	-0.045	0.051	0.066	0.207
15	0.785	0.079	0.100	0.088	-0.040	0.070	0.054	0.133
12	0.583	0.070	0.029	0.176	0.112	0.074	-0.068	-0.281
32	0.069	0.771	0.209	0.178	-0.051	0.008	0.007	0.082
31	0.090	0.719	0.257	0.108	-0.048	0.044	0.001	0.240
25	-0.032	0.610	0.068	-0.064	-0.011	0.490	0.012	-0.024
26	0.149	0.608	0.027	0.228	-0.068	0.341	-0.058	0.110
19	0.142	0.503	0.239	0.339	-0.002	0.090	-0.071	0.136
29	0.114	0.363	0.355	0.094	-0.024	0.225	0.130	0.320
20	0.055	0.109	0.754	0.046	0.127	0.020	0.013	-0.067
8	0.107	0.160	0.716	0.241	0.257	0.017	0.000	-0.096
9	0.106	0.148	0.715	0.143	0.113	0.113	0.133	-0.170
24	0.026	0.252	0.533	-0.052	0.048	0.074	0.054	0.329
18	0.150	0.004	0.404	0.337	0.244	0.139	-0.196	0.166
1	0.078	0.043	0.302	0.701	-0.021	0.188	0.073	0.091
2	0.071	0.063	0.283	0.699	0.073	0.169	0.129	0.150
3	0.171	0.346	-0.066	0.678	-0.087	0.124	0.084	-0.031
4	0.065	0.425	-0.059	0.600	0.103	0.127	0.024	-0.092
6	-0.035	-0.112	0.070	-0.115	0.802	0.019	0.135	0.014
7	-0.001	0.142	0.060	0.171	0.732	0.097	-0.105	-0.163
5	0.005	-0.128	0.147	0.057	0.637	-0.052	0.251	0.152
17	0.100	-0.032	0.294	-0.025	0.571	-0.115	-0.049	0.173
21	0.078	0.057	0.019	0.203	-0.104	0.719	-0.072	0.169
22	0.097	0.089	0.178	0.145	0.034	0.654	-0.038	0.092
23	0.115	0.351	-0.007	0.183	0.059	0.597	0.078	-0.020
10	0.108	0.044	-0.006	0.050	0.079	-0.100	0.793	0.017
11	0.246	-0.069	0.122	0.128	0.084	0.076	0.750	-0.023
28	-0.003	0.226	-0.286	-0.080	0.154	0.241	0.008	0.563
30	0.199	0.285	-0.059	0.303	-0.008	0.040	-0.094	0.533
27	0.096	0.081	0.250	0.291	0.152	0.246	0.062	0.376

Total	3.294	3.027	2.854	2.614	2.196	2.035	1.492	1.418
% of Variance	10.293	9.460	8.920	8.168	6.864	6.358	4.664	4.433
Cumulative %	10.293	19.753	28.673	36.840	43.704	50.062	54.726	59.159
Cronbach's $\alpha$	0.843	0.805	0.565	0.759	0.685	0.618	0.595	0.396

#### 4. Results

After determining the descriptive statistics, performing a test analysis on the related survey results for the industrial design students' time pressures and procrastination tendencies, and obtaining the statistical and analytic results for time pressure and procrastination, the relationship between them can be described as follows.

##### 4.1 Time Pressure

The descriptive statistics results for the time pressure questionnaire survey data is shown in Table 4. It contains the average (mean) and standard deviation (SD) for each question, and the statistics for the two genders and different course years.

Table 4. Descriptive statistics result of the time pressure questionnaire

No	M SD		Gender				Course Years					
			F		M		2		3		4	
			M	SD	M	SD	M	SD	M	SD	M	SD
1	3.461	0.956	3.479	0.920	3.428	1.014	3.548	0.930	3.331	0.991	3.440	0.954
2	3.279	0.936	3.275	0.926	3.275	0.957	3.299	0.930	3.278	0.953	3.247	0.928
3	3.530	0.924	3.563	0.948	3.479	0.892	3.582	0.919	3.503	0.937	3.467	0.920
4	3.643	0.937	3.647	0.923	3.631	0.965	3.774	0.915	3.556	0.964	3.522	0.927
5	2.304	1.108	2.286	1.140	2.331	1.064	2.157	1.089	2.238	1.063	2.566	1.124
6	2.299	1.166	2.356	1.231	2.212	1.059	2.027	1.135	2.285	1.163	2.703	1.102
7	3.084	1.156	3.151	1.180	2.992	1.118	3.000	1.212	3.119	1.177	3.176	1.057
8	2.909	1.078	2.846	1.092	2.996	1.054	2.958	1.093	2.808	1.141	2.934	1.001
9	3.128	1.066	3.106	1.065	3.148	1.072	3.149	1.083	3.093	1.116	3.137	0.996
10	2.891	1.148	2.913	1.154	2.860	1.146	2.843	1.203	2.954	1.145	2.901	1.073
11	2.631	1.073	2.625	1.101	2.627	1.030	2.517	1.098	2.715	1.048	2.720	1.053
12	3.092	1.261	3.162	1.241	2.970	1.283	3.103	1.307	2.947	1.300	3.203	1.145
13	2.935	1.198	2.908	1.194	2.958	1.202	2.874	1.229	2.881	1.222	3.060	1.133
14	2.945	1.183	2.952	1.185	2.919	1.184	2.854	1.290	2.887	1.146	3.121	1.039
15	3.082	1.251	3.098	1.289	3.047	1.197	3.069	1.317	2.980	1.186	3.187	1.211
16	3.190	1.192	3.179	1.214	3.199	1.166	3.195	1.263	3.066	1.187	3.264	1.075
17	2.591	1.167	2.555	1.181	2.640	1.153	2.418	1.146	2.642	1.202	2.797	1.131
18	3.035	1.105	3.087	1.097	2.941	1.109	3.123	1.067	2.821	1.161	3.104	1.085
19	3.418	1.010	3.479	0.999	3.331	1.028	3.483	1.017	3.344	1.033	3.374	0.977
20	3.002	1.057	2.986	1.037	3.013	1.090	2.935	1.070	3.013	1.107	3.104	0.983

21	3.190	1.012	3.224	1.006	3.148	1.019	3.234	1.068	3.099	0.957	3.198	0.966
22	3.138	1.028	3.148	1.040	3.119	1.012	3.184	1.101	3.033	1.029	3.165	0.914
23	3.512	1.013	3.471	1.032	3.572	0.989	3.567	1.015	3.470	1.005	3.456	1.017
24	3.215	1.020	3.210	1.005	3.220	1.049	3.238	1.051	3.185	0.976	3.203	1.007
25	4.096	0.873	4.137	0.875	4.034	0.875	4.149	0.862	4.040	0.878	4.066	0.883
26	3.872	0.922	3.885	0.943	3.847	0.896	4.042	0.929	3.702	0.929	3.769	0.868
27	2.997	1.032	2.975	1.053	3.021	1.004	2.912	1.065	3.046	0.968	3.055	1.018
28	3.164	1.042	3.134	1.078	3.199	0.989	3.264	1.028	3.000	1.052	3.143	1.036
29	3.447	0.953	3.480	0.936	3.390	0.981	3.502	0.995	3.444	0.943	3.371	0.902
30	3.059	1.063	3.084	1.075	3.004	1.042	3.199	1.109	2.914	0.979	2.978	1.051
31	3.671	0.987	3.678	0.989	3.653	0.988	3.824	1.030	3.543	0.915	3.544	0.949
32	3.948	0.882	3.980	0.904	3.894	0.851	4.034	0.843	3.828	0.958	3.912	0.862
Total	3.180	0.469	3.189	0.463	3.159	0.479	3.189	0.488	3.118	0.487	3.215	0.424

After analyzing and identifying the various factors, the overall descriptive statistics results for each factor, as well as those by gender and course year, are shown in Table 5. The results show that the total average time pressure for the industrial design students is 3.126 (SD = 0.456), which indicates that students frequently feel pressured. In terms of gender, the Work Deadline has the highest pressure points for both female and male students (Female M = 3.773, SD = 0.677, Male M = 3.691, SD = 0.656). The Unstable Workload has the lowest pressure points (Female M = 2.587, SD = 0.867, Male M = 2.543, SD = 0.761).

Table 5. Descriptive statistical results for the time pressure factors

Factors	M SD		Gender				Course Years					
			F		M		2		3		4	
			M	SD	M	SD	M	SD	M	SD	M	SD
P1 Leisure Time	3.049	0.955	3.060	0.937	3.019	0.982	3.019	1.006	2.952	0.945	3.167	0.882
P2 Work Deadline	<b>3.742</b>	<b>0.668</b>	<b>3.773</b>	<b>0.677</b>	<b>3.691</b>	<b>0.656</b>	<b>3.839</b>	<b>0.696</b>	<b>3.650</b>	<b>0.644</b>	<b>3.673</b>	<b>0.631</b>
P3 Disorder Status	3.058	0.756	3.047	0.749	3.064	0.767	3.080	0.739	2.984	0.831	3.097	0.709
P4 Overwork	3.478	0.715	3.491	0.704	3.453	0.734	3.551	0.697	3.417	0.752	3.419	0.704
P5 Unstable Workload	<b>2.569</b>	<b>0.824</b>	<b>2.587</b>	<b>0.867</b>	<b>2.543</b>	<b>0.761</b>	<b>2.400</b>	<b>0.804</b>	<b>2.571</b>	<b>0.839</b>	<b>2.810</b>	<b>0.781</b>
P6 Job Responsibility	3.280	0.766	3.281	0.801	3.280	0.713	3.328	0.800	3.201	0.779	3.273	0.705
P7 Situation Change	2.761	0.937	2.769	0.955	2.744	0.915	2.680	0.956	2.834	0.932	<b>2.810</b>	<b>0.914</b>
P8 Insufficient Time	3.073	0.704	3.064	0.725	3.075	0.668	3.125	0.724	2.987	0.660	3.059	0.700
Total	3.126	0.456	3.134	0.453	3.109	0.461	3.128	0.471	3.075	0.476	3.163	0.415

Note: Black highlighting indicates the highest point, and grey highlighting indicates the lowest point

According to each course year, Work Deadline is the factor with the highest points among the Time Pressure factors for students (sophomore: M = 3.839, SD = 0.696; junior: M = 3.650, SD = 0.644; senior: M = 3.673, SD = 0.631). Unstable Workload is the factor with the lowest points for sophomore and junior students (sophomore: M

= 2.400, SD = 0.804; junior: M = 2.571, SD = 0.839), and Unstable Workload (M = 2.810, SD = 0.781) and Situation Change have the lowest points for senior students (M = 2.810, SD = 0.914).

To further understand the time pressure differences between the two genders and different course years, an ANOVA analysis was conducted on seven factors; there was no significant difference between genders, but a significant difference existed in some of the factors between the different course years, as shown in Table 6. The differential factors between the different course years contain two factors, such as in Work Deadline and Unstable Workload. The course year and the Work Deadline indicated that time pressures among sophomore students are higher than those in junior and senior students, and an Unstable Workload situation is associated with the rank of the course year.

Table 6. ANOVA test results for time pressure factors for the different course years

Pressure Factors	F	Significance	Duncan
Work Deadline	5.234	.006**	(3,4) < 2
Unstable Workload	13.874	.000***	2 < 3 < 4

Note : \* p < .05, \*\* p < .01, \*\*\* p < .001

## 4.2 Procrastination

The descriptive statistics results for the degree of procrastination for each type of design tasks are shown in Table 7. This table contains the overall descriptive statistics results and those for the two genders and different course years. The total average procrastination degree is 2.759 (SD = 0.469), which indicates that industrial design students occasionally procrastinate. In terms of the two genders, female students have the highest degree of procrastination in concept generation (M = 3.062, SD = 0.851), and male students have the highest degree of procrastination in design research task (M = 2.936, SD = 0.799). Both female and male students have the lowest degree of procrastination in design documentation task (Female: M = 2.388, SD = 0.853; Male: M = 2.564, SD = 0.927).

As for different course years, the sophomore students have the highest degree of procrastination degree in the concept generation stage (M = 3.066, SD = 0.844), the junior students have the highest degree of procrastination degree in design research task (M = 2.940, SD = 0.826) and concept generation (M = 2.940, SD = 0.896), and the senior students have the highest degree of procrastination in concept generation (M = 2.989, SD = 0.901). Sophomore, junior, and senior students have the lowest degree of procrastination in design documentation (Sophomore: M = 2.300, SD = 0.880; Junior: M = 2.536, SD = 0.915; Senior: M = 2.68, SD = 0.872).

To further understand the time pressure differences between the two genders and different courses, an ANOVA analysis was conducted. The only significant difference was noted in procrastination for design documentation task between the genders, as shown in Table 8. The results indicate that male students have a higher degree of procrastination in design documentation than female students. Table 9 lists the items with significant differences between the different course years; the results show that senior students have a significantly higher degree of procrastination in design decision task than junior students. Senior students have a significantly higher degree of procrastination in design decision task than sophomore students.



Table 7. Procrastination degree survey results for design tasks

Tasks.			Gender				Course Years					
			F		M		2		3		4	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
<b>D1</b>	2.926	0.768	2.919	0.752	<b>2.936</b>	<b>0.799</b>	2.896	0.751	<b>2.940</b>	<b>0.826</b>	2.951	0.745
<b>D2</b>	<b>3.013</b>	<b>0.876</b>	<b>3.062</b>	<b>0.851</b>	2.928	0.905	<b>3.066</b>	<b>0.844</b>	2.940	0.896	<b>2.989</b>	<b>0.901</b>
<b>D3</b>	2.761	0.849	2.781	0.854	2.720	0.839	2.750	0.849	2.636	0.829	2.874	0.854
<b>D4</b>	2.632	0.983	2.598	0.978	2.665	0.973	2.635	1.010	2.603	0.994	2.654	0.944
<b>D5</b>	2.467	0.897	2.388	0.853	2.564	0.927	2.300	0.880	2.536	0.915	2.648	0.872
Total	2.759	0.469	2.749	0.620	2.762	0.646	2.728	0.641	2.731	0.651	2.823	0.610

Note: Black highlighting indicates the highest point, and grey highlighting indicates the lowest point

Table 8. ANOVA test results for the procrastination points between the two genders

Questions	F	Significance	
What is your degree of procrastination in your design documentation work?	5.626	.018*	F < M

Note : \* p < .05

Table 9. ANOVA test results for the procrastination points between the different course years

Questions	F	Significance	Duncan
What is your degree of procrastination in your design decision work?	3.291	.038*	(3, 2) ≤ (2,4)
What is your degree of procrastination in your design documentation work?	8.885	.000***	2 < (3,4)

Note : \* p < .05, \*\* p < .01, \*\*\* p < .001

### 4.3 Time Pressure and Procrastination

To understand the relationship between students' time pressures and procrastination, the researchers conducted a correlation analysis on the time pressure points and their corresponding degrees of procrastination; the result of the Pearson correlation analysis was 0.405 (p = .000), which indicates a moderate correlation and that when pressure increases, the tendency toward procrastination also increases. Table 10 illustrates the correlation between the degree of procrastination for each pressure factor and design tasks, as well as the correlation analysis between them. The pressure factor P3, Disorder Status, has the highest influence on procrastination, which shows a moderate to low correlation (0.411~0.268), especially for the design research (D1) task and design presentation (D4).

Table 10. Correlation test results for procrastination according to the time pressure factor and design tasks

Procrastination Factors	Tasks				
	D1	D2	D3	D4	D5
P1 Leisure Time	0.111**	0.098*	0.118**	0.132**	0.123**
P2 Work Deadline	0.225**	0.267**	0.224**	0.193**	0.099*
P3 Disorder Status	<b>0.411**</b>	0.355**	0.320**	<b>0.398**</b>	0.268**
P4 Overwork	0.224**	0.235**	0.223**	0.244**	0.171**
P5 Unstable Workload	0.090*	0.036	0.058	0.076	0.160**
P6 Work Duty	0.107**	0.131**	0.159**	0.090*	0.074
P7 Situation Change	0.098*	0.088*	0.098*	0.139**	0.169**
P8 Insufficient time	0.125**	0.154**	0.123**	0.042	0.082*

Note: \*  $p < .05$ , \*\*  $p < .01$ . D1: design research, D2: concept generation, D3: design decision, D4: design presentation, D5: design presentation

To further understand the degree of procrastination in the different phases of design task and the degree of bother caused by procrastination, as well as the difference in students' willingness to reduce procrastination, an ANOVA analysis was conducted on the related data in the questionnaire; these results are shown in Table 11. This table shows that concept generation and design research task generate the highest degree procrastination, and that design documentation has the lowest degree of procrastination. Concept generation results in the highest degree of bother caused by procrastination, and the next highest degree is found in design research task. However, students hope to improve their procrastination habits in these items the most, as well as in concept generation task.

Table 11. ANOVA test results for degree of procrastination, degree of bother, and willingness to reduce Procrastination

Questions	F	Significance	Duncan
Procrastination Degree	36.260	.000***	D5 < D4 < D3 < (D1, D2)
Degree of Bother	50.760	.000***	D5 < (D4, D3) < D1 < D2
Willingness to Reduce Procrastination	11.582	.000***	D5 < (D3, D4, D1) < D2

Note : \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## 5. Conclusions

The main purpose of this study was to explore the relationship between time pressures and procrastination in industrial design students using a questionnaire survey. The survey results show that the total pressure degree point is 3.126 (SD=0.791), the point of procrastination is 2.759 (SD=0.634). The correlation analysis indicated a moderate correlation between procrastination and pressure (Pearson = 0.405,  $p = .000$ ).

No significance differences in overall time pressures were noted between the two genders and different grades; however, there were partial differences in the detailed analysis. From the viewpoint of the different course years, due to sophomore students just completing their freshman year with common knowledge and basic design courses, and stepping into the learning of professional and practical foundation design core courses, there may be adaptation problems; time pressures were noted when they faced design work deadlines. However, after several years of design learning, junior and senior students become more familiar with the design process, and course contents and requirements. On the other hand, the number of prescribed and elective courses decrease as a student progresses at school, therefore, junior and senior students may have more time to engage in the learning of professional core courses. The pressure of time distribution for more senior students may actually decrease.

In terms of the core courses, the design core course progress for freshman and sophomore students is mainly managed by the faculty. The topics prescribed for these courses are mainly projects for design competitions or are projects with shorter design processes; thus, the deadlines are constant and tight, resulting in higher time pressure. As for the junior and senior courses, especially the senior students' graduation project, the process is self-managed; thus, students have more decision-making power. However, they may also fail to manage their time effectively because of insufficient experience, resulting in time pressure due to work schedules and time instability.

For procrastination in design tasks, there was no significant difference between the two genders and the different course years. Concept generation was the type of design task having the highest degree of procrastination for all students, and also the item that caused them the highest degree of bother, as well as the one that they most wanted to improve. In a study conducted among university and college industrial design students, Chen and Tang [2] discovered that students thought that concept generation is the most difficult design work. Therefore, in the core courses, students tend to prolong their concept generation studies, properly adjust each phase in the process of design, clarify the phase tasks, and duly use time management to improve their procrastination status.

Design students face many types of pressures in their learning process. The present study adopted a questionnaire survey method to explore time pressures and procrastination behaviors in students' learning of the core courses. Our research discovered certain issues worthy of further exploration, such as whether time pressure affects students' learning effectiveness; whether time pressure and procrastination affect learning satisfaction; and the determination of other reasons why students procrastinate. In addition, in the questionnaire used in this study, several factors had low reliability, thus, further investigation might correct and expand the questionnaire subject and survey target to further verify the outcomes of the present research.

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