

Preliminary Study on the Learning Pressure of Undergraduate Industrial Design Students

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Abstract

Learning pressure affects students' learning process and performance. Industrial design education emphasizes that operations on real design problems that have heavy working loads may cause learning pressure. The purpose of this study is to explore the issues causing learning pressure and the pressure management strategies of undergraduate industrial design students. There were 297 students who participated in the questionnaire survey. The main findings are as follows: First, learning pressure includes academic pressure, peer pressure, self-expectations, time pressure, financial pressure, pressure from instructors, external pressure, future career, pressure from parents, resource pressure, achievement, and situational pressure. In addition, the main learning pressure is caused by finance, time, resources, external issues, and future career. Second, the pressure management strategies include problem solving, procrastination and escape, help seeking, leisure, emotional management, and self-adjustment. The most useful strategy for managing pressure is leisure, and procrastination and escape is the least useful strategy. Third, all learning pressures are significantly correlated with procrastination and escape strategy, but the coefficients are low. The results can be a reference for industrial design education and related research.

Keywords: learning pressure, pressure management strategy, industrial design, design education

Design education is like a coach or apprentice system that involves “learning by doing.” Students need to spend a significant amount of time working on real design problems, but they experience many learning problems (Chen & Tang, 2013) and time and assignment pressures (Lin & Chen, 2013). Learning pressure and problems influence students' learning performance. The purpose of this study is to explore the learning pressure that students experience and the pressure management strategies they use throughout their learning process.

Learning Pressure

Pressure can be defined in many different ways; it can be stimulate, reaction, or process. It causes physiological diseases, behavior problems, psychological distress if the pressure is not released. The students will lead learning pressure through learning process with various factors, such as stress from courses, barrier to communicating with teachers, ineffective learning methods, poor relationships with family and peers, career planning, time management, etc. (Peng, Cherng, Chen, & Lin, 2013).

Learning pressure affects students' learning (Rau, Gao, & Wu, 2008). Appropriate pressure is the driving force of learning, but escape and procrastination in a given situation will lead to

learning pressure and nervousness, even influencing students' participation in learning activities (Peng et al., 2013). Early discovery and offering support can help students relieve their learning pressure and to achieve better learning outcomes.

Industrial design students experience many problems throughout their learning process (Chen & Tang, 2013; Yang, You, & Chen, 2005; You, Yang, & Liao, 2007) that may cause learning pressure. When faced with such pressure, students may procrastinate (Lin & Chen, 2013), which may lead to failure, resulting in additional pressure or increasing pressure. Therefore, understanding the learning pressure of industrial design students and explore the factors causing pressure can help students find the resources and methods to relieve the pressure and to improve their learning effectiveness.

The main method for measuring learning pressure and exploring the causes is questionnaire surveys and interviews. For example, Bukhsh, Shahzad, and Nisa (2011) investigated undergraduate students' learning pressure and the pressure management strategies using a questionnaire survey. They found that students experienced fatigue during pressure. The main causes of pressure were the burden of studying and assignments. The main strategies for relieving pressure were watching television/movies, listening to music, or taking part in other leisure time activities. Sun, Dunne, Hou, and Xu (2011) developed an initial validation of a new instrument to measure academic stress. They conducted a series of cross-sectional questionnaire surveys to examine their psychometric properties and then proposed the final instrument that contains five latent variables: academic pressure, workload, worry about grades, self-expectations, and despondency.

There are many factors that may cause learning pressure in learning industrial design. To understand the learning pressure and the pressure management strategies that students experienced and used, a questionnaire survey was administered to collect the data.

Research Methods

Participants

There were 297 undergraduate industrial students who participated the survey, including 122 male students (41.1%) and 175 female students (58.9%). There were 150 (50.5%) from public university, 147 (49.5%) from private university, and 177 (59.6%) from university, 120 (40.4%) from a university of science and technology.

Data Collection and Analysis

The questionnaire survey was conducted to collect the data. The questionnaire was design according the references and previous research. The categories of questions include the basic information, learning pressure involved in different course types, the issues causing the pressure, and the strategies to relieve the pressure. A Likert scale with five levels was used to measure the degree of the pressure and the efficiency of the pressure management strategies.

All the data were entered into a Microsoft Excel datasheet, then sorted and checked. Finally, the data were analyzed using SPSS software with factor analysis and correlation analysis.

Results

Learning Pressure in Different Courses

A five-level Likert scale was used to measure the learning pressure in different types of courses. A score of 1 represented “no pressure,” and 5 represented “tremendous pressure.” Table 1 presents the results. The average overall learning pressure was 3.33 (SD = .834). The core (practice) courses had the highest learning pressure score of 3.56 (SD = .837), and the score of general education courses was the lowest 2.32 (SD = .963).

Table 1. The learning pressure in different course types

Course type	N	M	SD
Overall	297	3.33	.834
Core (Practice) courses	297	3.56	.837
Professional courses	297	2.99	.860
General education courses	297	2.32	.963

Issues Causing Learning Pressure

To explore the issues that caused learning pressure, 50 questions were proposed according the references and previous research. Table 2 lists the mean score (M) and standard deviation (SD) of the questions. A five-level Likert scale was used in the questionnaire. The results demonstrated that the top three questions are: A32. Outsourcing costs are too high, making me experience a great deal of pressure (M = 4.08, SD = .917); A33. The high cost of graduation exhibition makes experience a great deal of pressure (M = 4.18, SD = .895); A43. I experience a great deal of pressure when I cannot achieve my own design goals (M = 4.18, SD = .802). The results illustrated that the high cost for outsourcing and exhibition, and self-achievement requirements cause students to experience considerable pressure.

Table 2. The issues causing learning pressure

Questions	M	SD
A1. Daily study causes me to experience a great deal of pressure.	3.34	.872
A2. There are too many assignments and homework in my professional courses.	3.03	.924
A3. There are too many design tasks in my core (practice) courses.	3.03	.890
A4. The requirements and assignments of my professional course causes me a great deal of stress.	3.24	.945
A5. There are too many presentation and evaluation activities in my professional courses.	2.80	8.51
A6. There are too many presentation and evaluation activities in my core (practice) courses.	2.83	.841
A7. My grades are not good; I feel sorry for the teacher.	2.63	1.098
A8. The requirements from core (practice) courses' instructors cause me a lot of pressure.	2.95	.90
A9. Instructors give too little guidance, preventing me from knowing how to finish the assignment.	3.11	.996
A10. The teaching methods of core (practice) instructors are not suitable for me.	2.92	.878
A11. The comments of core (practice) instructors cause me to experience a great deal of pressure.	3.01	.928
A12. The instructors did not describe the objectives and requirements of the course clearly.	3.00	.986
A13. It is difficult to concentrate in class.	2.65	.967
A14. I do not know how to meet the instructors' request.	3.28	1.015
A15. The competition between classmates makes me experience pressure.	3.26	1.112
A16. Having a classmate with good design abilities in class makes me experience pressure.	3.48	1.092

Questions	M	SD
A17. My bad design work makes me experience pressure.	3.85	.957
A18. I am afraid that my classmates will criticize my design work.	3.27	1.070
A19. My parents' attention to my courses and grades makes me feel stressed.	2.56	1.038
A20. My poor grade makes me feel sorry for my parents.	3.21	1.130
A21. Parents are too concerned about my design, which makes me feel stressed.	2.60	.990
A22. Parents care about my life makes me feel stressed.	3.01	1.099
A23. I feel a great deal of pressure regarding my future career or study.	3.81	1.056
A24. It is difficult to decide whether to engage in a design job in the future.	3.26	1.172
A25. I feel a great deal of pressure to compete with other graduates from other schools.	3.61	1.033
A26. I have no confidence in my abilities and feel it's difficult to find job.	3.44	1.078
A27. I feel there are too many assignments, but not enough time.	3.57	.994
A28. My poor time management skills make me feel a great deal of pressure.	3.74	.961
A29. Always feeling that there is not enough time make me experience a great deal of pressure.	3.69	.944
A30. Often having a lot of homework at the same time make me experience a great deal of pressure.	3.71	.938
A31. The high material costs make me experience a great deal of pressure.	3.92	.944
A32. Outsourcing costs are too high, making me experience a great deal of pressure.	4.08	.917
A33. The high cost of graduation exhibition makes me experience a great deal of pressure.	4.18	.895
A34. I feel stressed when cannot achieve my own design goals.	4.18	.802
A35. I often feel that my design is not good enough.	3.86	.925
A36. I am often worry that my design is not be approved by the instructors.	3.73	.929
A37. I am not satisfied with my performance in the design professional courses.	3.44	.903
A38. I have no confidence in my design ability.	3.20	1.013
A39. I feel a great deal of pressure in gaining my instructors' approval of my design.	3.45	.945
A40. I am afraid to receive criticism from my classmates.	3.28	.983
A41. I feel pressure when faced with the instructors.	3.47	.949
A42. There will be pressure when facing external reviews.	3.77	.962
A43. The learning pressure will affect my emotions.	3.51	1.028
A44. I will feel bad when the pressure is great.	3.41	.976
A45. The pressure from my instructors helps in my learning and progress with assignments.	3.49	.931
A46. It's hard to finish the assignments when there is higher learning pressure.	3.21	.998
A47. The learning atmosphere of the class affects my learning.	3.78	.907
A48. Simultaneously taking a number of professional courses make me feel highly pressured.	3.37	.916
A49. The opening time of the workshops is not enough that resulting pressure.	3.65	1.183
A50. The learning space and resources are insufficient, affecting my learning.	3.52	1.098

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity were used to verify the data for factor analysis. The results shown Table 3 indicate that Bartlett's Test of Sphericity is significant ($p < .05$). Therefore, the data are suitable for factor analysis.

Table 3. Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity of issues causing learning pressure.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	7715.468
	df	1225
	Sig.	.000

Table 4 presents the total variance explained by the learning pressure sources. Exploratory factor analysis was performed using the principle component analysis method. Finally, the 12 components extracted with the cumulative total variance explained 67.12%.

Table 4. Total variance explained by learning pressure sources

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	14.071	28.142	28.142	14.071	28.142	28.142	4.516	9.033	9.033
2	3.363	6.725	34.867	3.363	6.725	34.867	3.845	7.691	16.724
3	2.804	5.609	40.476	2.804	5.609	40.476	3.701	7.403	24.126
4	2.310	4.620	45.097	2.310	4.620	45.097	3.066	6.132	30.259
5	1.915	3.829	48.926	1.915	3.829	48.926	2.980	5.959	36.218
6	1.550	3.099	52.025	1.550	3.099	52.025	2.872	5.744	41.962
7	1.542	3.085	55.110	1.542	3.085	55.110	2.689	5.377	47.340
8	1.382	2.764	57.873	1.382	2.764	57.873	2.600	5.199	52.539
9	1.281	2.563	60.436	1.281	2.563	60.436	2.214	4.429	56.968
10	1.234	2.468	62.905	1.234	2.468	62.905	1.921	3.843	60.811
11	1.066	2.133	65.037	1.066	2.133	65.037	1.720	3.439	64.250
12	1.042	2.083	67.121	1.042	2.083	67.121	1.435	2.871	67.121

Extraction Method: Principle Component Analysis

Table 5 presents the rotated component matrix of issues causing learning pressure using the Varimax with Kaiser Normalization method. There were 12 components, and each component includes several questions. All the components are named according their features. The name of each components are academic pressure, peer pressure, self- expectations, time pressure, financial pressure, pressure from instructors, external pressure, future career, pressure from parents, resource pressure, achievement, and situational pressure.

Table 5. Rotated component matrix of learning pressure sources

Question	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
A6.	.796	-.064	-.038	-.021	.126	.149	.220	.132	.059	.005	.103	-.043
A3.	.778	.083	.126	.199	.014	.071	.030	.039	.020	.079	.022	.111
A5.	.771	-.120	-.050	-.054	.099	.098	.242	.157	.162	-.076	.044	-.045
A2.	.748	.169	.119	.206	.017	.105	-.028	.004	-.030	.038	-.093	.054
A4.	.658	.254	.250	.200	.043	.184	-.052	.049	-.061	.089	.131	.067
A1.	.579	.251	.370	.218	.099	.029	.016	.165	-.065	.071	.006	.008
A8.	.516	.261	.197	.176	.161	.189	.027	-.028	-.030	.115	.391	.133
A15.	.188	.762	.141	.050	-.031	-.064	.093	.224	.093	.072	.145	-.030
A17.	.051	.762	.132	.141	.131	.021	.139	.239	.097	.121	-.059	.071

Question	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
A16.	.097	.743	.155	.176	-.055	-.073	.062	.286	.132	.093	.116	.077
A18.	.118	.578	.182	.173	.223	.169	.277	-.149	.218	-.121	.010	-.100
A40.	.117	.449	.370	.092	.297	.153	.356	-.121	.249	-.187	.093	-.027
A38.	.138	.120	.710	.077	.105	.071	.108	.292	.131	-.046	.117	-.040
A37.	.188	.132	.668	.152	.024	.090	.136	.216	.084	.068	.199	-.056
A35.	.012	.332	.595	.217	.163	.168	.153	.296	.017	-.004	-.031	.025
A36.	.135	.291	.547	.205	.252	.127	.318	.107	.057	-.050	.079	.025
A44.	.117	.059	.518	.054	.092	.066	.457	.011	.004	.170	.032	.392
A39.	.176	.375	.427	.136	.255	.105	.332	-.012	.097	-.042	.277	.008
A29.	.198	.075	.123	.808	.154	.050	.127	.114	.079	.030	.058	.098
A28.	.034	.120	.191	.687	.054	.085	.130	.120	.028	.110	.104	-.160
A27.	.418	.118	.037	.651	.140	.050	.019	.112	-.006	.218	-.001	.111
A30.	.315	.212	.175	.631	.240	-.016	.136	.076	.003	.190	-.038	.120
A34.	-.009	.288	.264	.404	.371	.070	.306	.117	.005	.185	-.041	.075
A32.	.122	.027	.119	.079	.844	.077	.052	.108	-.037	.131	.047	.079
A33.	.009	.077	.065	.155	.785	.107	.171	.207	-.084	.121	.013	.016
A31.	.189	.070	.145	.169	.753	-.023	-.025	.144	.039	.156	.058	-.006
A10.	.173	.015	.077	-.100	.034	.837	.076	.052	.050	.047	.038	-.028
A9.	.119	.029	.064	.140	.046	.812	.003	.125	.086	.047	-.002	.079
A12.	.106	-.026	.069	.070	.049	.735	-.019	-.008	.094	.174	-.021	.031
A14.	.180	.142	.325	.111	.058	.464	.125	.220	.037	.082	.328	.023
A43.	.086	.087	.207	.148	.049	-.034	.673	.128	.025	.164	.132	.193
A41.	.203	.209	.235	.145	.116	.107	.610	.186	.056	.032	.087	-.003
A42.	.117	.338	.158	.156	.069	-.010	.601	.253	.054	.028	.058	-.120
A24.	.192	.111	.192	.058	.154	.177	.041	.688	.130	.101	-.083	.014
A25.	.131	.302	.250	.132	.164	.056	.229	.679	.074	.039	.052	.029
A26.	.081	.184	.424	.151	.134	.121	.146	.593	.004	-.041	.220	-.020
A23.	.110	.210	.140	.206	.316	-.022	.175	.584	.118	-.027	.123	.097
A21.	.056	.092	.080	-.038	-.057	.130	.017	.013	.861	.056	.044	-.004
A19.	.085	.149	-.022	-.033	-.136	.073	.148	.103	.690	-.096	.256	.153
A22.	-.058	.158	.178	.154	.117	.056	-.050	.111	.677	.098	-.052	-.052
A50.	.063	.061	-.009	.178	.193	.195	.080	-.056	.026	.761	.048	.048
A49.	.121	.037	.037	.203	.154	.144	.043	.125	.025	.753	.080	-.076
A7.	.066	.073	.284	-.018	.045	-.031	.060	.026	.104	.152	.752	-.054
A20.	-.059	-.014	-.068	.140	-.018	.072	.275	.261	.370	-.114	.467	.039
A11.	.300	.273	.085	.103	.258	.298	.257	.003	.071	-.072	.406	.049
A46.	.298	-.042	.421	.073	.115	.086	.166	.099	.153	.101	-.032	.536
A45.	-.126	.252	.060	-.088	-.016	-.264	.287	-.034	-.046	.291	-.239	-.472
A13.	.107	-.089	.305	.057	.068	.352	-.016	.009	.147	.149	.145	-.446
A47.	-.018	.365	-.005	.004	.233	.061	.212	.004	.042	.394	-.047	.398
A48.	.251	.295	-.031	.339	.097	.154	.205	.058	.185	.104	.039	.397

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

Management Strategies for Learning Pressure

The 25 strategies used to manage learning pressure were retrieved from previous and related studies and then investigated using five-point Likert scales in which 1 represented “strongly disagree” and 5 “strongly agree.” Table 6 presents the results; there were four strategies with scores higher than 4.0, including B22. Engaging in outdoor activities helps to eliminate stress (M = 4.19, SD = .776); B20. I will use listening music, watching movies, and other leisure

methods to eliminate the pressure (M = 4.13, SD = .856); B2. I will try to overcome my learning difficulties (M = 4.01, SD = .604); and B21. Sleeping can help to eliminate stress (M = 4.00, SD = 1.005).

Table 6. Pressure management strategies Used

Strategies	M	SD
B1. I will try to figure out the reason when I am facing learning problems.	3.96	.625
B2. I will try to overcome my learning difficulties.	4.01	.604
B3. I would like to withdraw from some courses when facing learning pressure.	3.29	1.071
B4. I will objectively analyze the learning problems I have encountered from various angles.	3.72	.731
B5. I will try to solve my learning problems.	3.98	.690
B6. I will refer to a previous method to find ways to solve my learning problems and stress.	3.84	.723
B7. I will find more trusted peers or friends to help when facing learning problems.	3.96	.809
B8. I will try to find a variety of information to solve my learning problems.	3.91	.677
B9. I will participate in related activities to help myself solve my learning problems.	3.33	.901
B10. I will use religious beliefs to help solve my learning problems.	2.09	1.114
B11. I will try to use the school's counseling system to help solve my learning problems.	2.17	.948
B12. I used to brush my learning problems aside without trying to solve them.	2.35	1.002
B13. I easily give up and do not try to solve my learning problems.	2.23	.975
B14. I often do not solve my learning problems because I am upset.	2.56	1.105
B15. I think of school as a way to solve my learning problems.	1.64	1.063
B16. When I encounter a learning problem, my absenteeism will increase.	2.41	1.241
B17. Eating and drinking can help me to reduce my stress.	3.13	1.198
B18. I think the pressure and the problem that has arisen cannot be changed.	2.73	1.099
B19. I will use good emotional management strategies to adjust my negative emotions and stress.	3.43	.891
B20. I will listen to music, watch movies, and use other leisure methods to eliminate the pressure.	4.13	.856
B21. Sleeping can help to eliminate my stress.	4.00	1.005
B22. Engaging in outdoor activities helps to eliminate my stress.	4.19	.776
B23. I will communicate with my instructors to reduce my learning pressure.	2.94	1.069
B24. I will persuade myself to accept the status.	3.52	.934
B25. I will try to change myself to improve my learning problems and obstacles.	3.84	.716

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity were used to verify the data for factor analysis. The results shown in Table 7 indicate that the Bartlett's Test of Sphericity is significant ($p < .05$). Therefore, the data are suitable for factor analysis.

Table 7. Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity of pressure management strategies

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.812
Bartlett's Test of Sphericity	Approx. Chi-Square	2235.583
	df	300
	Sig.	.000

Table 8 presents the total variance explained by the pressure management strategies. Exploratory factor analysis was performed using the principle component analysis method. Finally, the six components extracted with the cumulative total variance explained 55.82%.

Table 8. Total variance explained by pressure management strategies

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	5.457	21.827	21.827	5.457	21.827	21.827	3.856	15.424	15.424
2	2.540	10.160	31.987	2.540	10.160	31.987	3.121	12.483	27.907
3	1.952	7.807	39.794	1.952	7.807	39.794	2.085	8.339	36.247
4	1.628	6.511	46.305	1.628	6.511	46.305	1.960	7.838	44.085
5	1.278	5.111	51.416	1.278	5.111	51.416	1.540	6.160	50.245
6	1.101	4.406	55.821	1.101	4.406	55.821	1.394	5.576	55.821

Extraction Method: Principle Component Analysis

Table 9 presents the rotated component matrix of pressure management strategies using the Varimax with Kaiser Normalization method. There were six components, and each component includes several questions. The components were problem solving, procrastination and escape, help seeking, leisure, emotional management, and self- adjustment.

Table 9. Rotated component matrix for pressure management strategies

Strategies	Component					
	1	2	3	4	5	6
B5.	.805	-.176	.030	-.023	.069	.148
B1.	.790	-.039	.003	.116	.044	.009
B4.	.722	-.064	.146	-.174	.006	.233
B2.	.697	-.078	.004	.080	.022	-.021
B6.	.658	-.089	.091	.180	.160	.008
B8.	.542	-.062	.121	.346	-.082	-.164
B7.	.378	-.003	.164	.223	.271	-.137
B13.	-.281	.761	.128	-.199	-.018	.077
B14.	-.160	.730	.074	-.261	.110	-.043
B12.	-.310	.690	.223	-.218	.096	.017
B15.	-.062	.629	.003	-.029	-.174	.098
B16.	.047	.599	-.065	-.067	.127	-.144
B3.	.126	.526	-.143	.224	-.136	-.062
B18.	-.148	.469	-.317	.086	.004	.293
B11.	.047	.061	.781	-.093	.023	.033
B10.	.028	.145	.715	.063	-.313	.020
B9.	.325	-.020	.612	.168	.140	-.274
B23.	.070	-.226	.518	.084	.243	.161
B21.	.047	-.129	.010	.793	.149	.066
B22.	.187	-.144	.080	.762	.122	.136
B17.	-.093	.135	-.006	.057	.657	-.135
B19.	.303	-.086	.073	.067	.603	.142
B20.	.202	-.095	-.107	.400	.549	.200
B24.	.058	.090	-.014	.104	-.015	.841
B25.	.411	-.267	.166	.230	.172	.482

Strategies	Component					
	1	2	3	4	5	6
Extraction Method: Principal Component Analysis						
Rotation Method: Varimax with Kaiser Normalization						

Correlation between Learning Pressure and Pressure Management Strategies

Figure 1 presents the boxplot of each component of issues caused learning pressure. The top five issues were financial pressure (M = 4.06, SD = .81), time pressure (M = 0.78, SD = .72), resource pressure (M = 3.59, SD = 1.03), external pressure (M = 3.58, SD = .80), and future career (M = 3.53, SD = .88). Figure 2 presents a boxplot of pressure management strategies. The most useful strategies to manage pressure were leisure (M = 4.10, SD = .78) and problem solving (M = 3.91, SD = .48). The least useful strategy was procrastination and escape (M = 2.46, SD = .70).

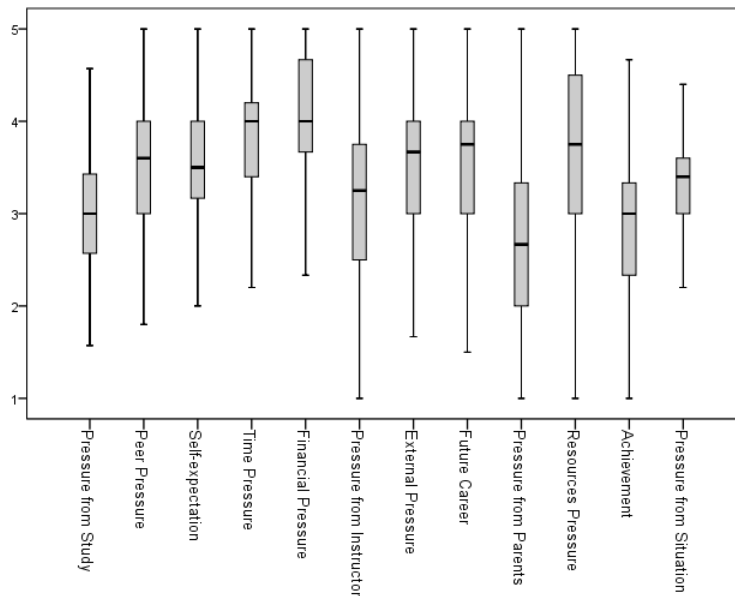


Figure 1: The boxplot of learning pressure sources.

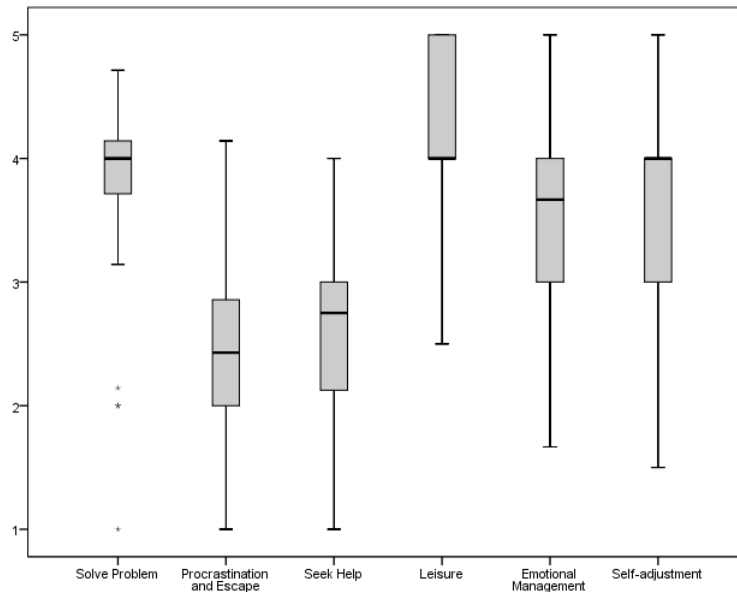


Figure 2: The boxplot of pressure management strategies.

A Pearson correlation analysis was conducted to explore the relationship between issues causing learning pressure and pressure management strategies. The results are presented in Table 10. All the correlation coefficients were low, but there are still significant correlation pairs. All the issues that caused learning pressure had a significant positive correlation with the procrastination and escape strategy. In addition, academic pressure had a significant negative correlation with problem solving, and time pressure also had a significant negative correlation with help seeking. Financial pressure had a significant positive correlation with emotional management. Future career had significant positive correlation with self- adjustment. Resource pressure had a significant positive correlation with emotional management and a negative correlation with self-adjustment. Situational pressure had a significant positive correlation with emotional management.

Table 10. The correlations between learning pressure sources and pressure management strategies (* $p < .05$, ** $p < .01$)

		Pressure Management Strategies					
		Problem Solving	Procrastination and Escape	Help Seeking	Leisure	Emotional Management	Self-adjustment
Learning Pressures	Academic Pressure	-.190**	.338**	-.057	.001	.046	.013
	Peer Pressure	-.004	.212**	-.014	-.008	.103	.099
	Self-expectations	-.111	.359**	-.077	.024	.063	.071
	Time Pressure	-.021	.221**	-.131*	.104	.110	.055
	Financial Pressure	.061	.204**	-.092	.088	.145*	.009
	Pressure from Instructors	-.094	.276**	-.102	-.007	.083	-.007
	External Pressure	-.024	.260**	-.027	.049	.049	.046
	Future Career	-.036	.354**	-.103	-.046	.107	.130*
	Pressure from Parents	.047	.183**	.067	-.054	.035	-.005
	Resource Pressure	.050	.165**	-.061	.024	.137*	-.135*
	Achievement	-.084	.283**	.039	.009	.089	.050
	Situational Pressure	-.005	.239**	.017	.050	.182**	.030

Conclusions

Learning pressure affects students' learning performance, especially in industrial design education where students experience many problems that cause pressure. The purpose of this study was to investigate the learning pressure and management strategies of undergraduate industrial design students.

The results indicate the following:

- 1) Learning pressure includes academic pressure, peer pressure, self-expectations, time pressure, financial pressure, pressure from instructors, external pressure, future career, pressure from parents, resource pressure, achievement, and situational pressure. In addition, the main learning pressure is caused by finance, time, resources, external issues, and future career.
- 2) The pressure management strategies include problem solving, procrastination and escape, help seeking, leisure, emotional management, and self-adjustment. The most useful strategy for managing pressure is leisure, and procrastination and escape is the least useful strategy.
- 3) All learning pressures are significantly correlated with the procrastination and escape strategy, but the coefficients are low.

Industrial design education is a complex challenge. This study is exploratory, and therefore its findings are not conclusive. However, they can deepen the understanding of the design learning process. They could also be applied in teaching and future research. However, there is a continuing need for an adequate theoretical basis for the practical application of design education.

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