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DETERMINATION OF ATTITUDES AND QUALIFICATIONS OF CIVIL ENGINEERING STUDENTS FOR USE OF VOCATIONAL SOFTWARE

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ABSTRACT: It is extremely important for candidate engineers of today to be raised as equipped engineers who have grasped the importance of technology throughout their education life and who use it effectively and efficiently, are aware of the responsibilities brought by their profession, can generate practical and analytical solutions when faced with problems, constantly follow the developments in their professional field, are aware of lifelong learning, can apply their knowledge acquired during their academic life to life, and briefly who can fulfill the requirements of the age of technology. In a sense, candidate engineers need to have the knowledge, skills and self-confidence to effectively use technology during the education process so that they will be able to fulfill all the aforementioned requirements. In this context, in terms of professional development, it is important for candidate engineers to have an insight about computer software related to their professional fields and improve themselves continuously in this regard. By the courtesy of computer software packages, which have developed rapidly in recent years, design and analysis of an engineering system can be done by software packages based on theoretical principles on the basis of standards and regulations. In this context, the fact that the engineer candidates can use the package programs related to their professional fields is an important factor in terms of employment. The aim of this study was to gain insight into the knowledge and awareness of Civil Engineering students about the package programs related to their professional fields, which programs will also contribute to their employment after graduation, and to learn their interest in using these programs. In accordance with this aim, the idea to conduct this descriptive study emerged in order to determine the attitudes and skills of the students from the Department of Civil Engineering, Faculty of Technology, Isparta University of Applied Sciences to using the package programs related to their professional field and knowing programming languages. In this study, a survey was conducted on a total of 311 students studying at the Department of Civil Engineering, Faculty of Technology, Isparta University of Applied Sciences during the academic year 2018-2019 to measure their knowledge and usage of package programs. The analyses were performed by SPSS statistical package program, and tests such as frequency analysis, variance analysis, t-test and reliability analysis were used to analyze data. In the light of the data obtained, it was investigated whether the attitudes of the students to using package programs showed any significant differences by variables, including class level, gender, purpose of using computer and using package programs.

Keywords: Civil Engineering, Technology, Computer, Professional Software, Package Program, Program Languages.

1. INTRODUCTION

Technological advances force companies to hire employees well-trained in the field of computer. University education is one of the most important opportunities to have an education and gain knowledge in this field before stepping into the business life [27]. When today's conditions are examined and based on estimations regarding scientific and technological advances that can be seen in the near future, it is clear that the new generation Civil Engineers should be trained as engineers who can think, produce solutions to problems, are open to

innovations and interpret such innovations [14]. Use and dissemination of information technologies in areas such as engineering education that use, produce and, in short, reform technology is inevitable [2].

Computer programs, developed in recent times that analyze and design are among the most important factors that led to the analysis phase [1]. The possibilities offered by the computer package programs have shown their effect especially in the field of engineering. Computer technology and special technical software are so developed that engineers and computers have become an inseparable duo [11]. Today, software designed for construction companies, capable of managing all field activities, project management, financial and operational activities, has started to be used in the construction sector [22].

Since computer package programs make it possible to design, plan, analyze and report processes in a fast and practical way, designers of software offer training and enhancement support, programs are able to constantly upgrade themselves according to new developments, and have visual features, the use of package programs has become widespread. Now, many engineering problems can be solved with advanced computer package programs. Therefore, it would be useful to look at students' knowledge, skills and attitudes for use of these programs in order to enable them to use the computer package programs related to their professional fields in an appropriate and effective manner throughout and after their engineering education.

When the literature is examined, it is seen that the researchers are working on engineering education and these studies are increasing day by day. Studies conducted on this subject matter include, among others, engineering education [6], civil engineering education [38], [4], [5], [37], [26], [7], three-phase laboratory teaching and learning methodology in the engineering education [10], efficacy of e-learning and traditional learning in the construction safety education [16], use of computer in engineering and architecture education [30], [28], [18] importance of the computer-assisted education in professional development [15], efficacy of health and safety training in the construction industry using traditional tools and computer-assisted technologies (H&S) [13], computer software and communication technologies in the construction industry [39] and [22], Building Information Model in the construction industry (BIM) [12] and [29], use of the PpcProject software in the Software Project Management for educational purposes [32], use of three-dimensional (3D) and Virtual reality (VR) models in the civil engineering education [33], examination of advantages offered by Autodesk Developer Network (ADN) and Academic Partnership (AP) programs in terms of university education [35].

In this study conducted by [3], a questionnaire was applied to the fourth grade students studying in Civil Engineering departments of Çukurova University, Erciyes University and Gazi University in order to determine the deficiencies of civil engineering education, and as a result of questions posed in order to ascertain competence of students terms of "Level of Use in Package Programs and Software", it was concluded that the students were competent in using MS Office and AutoCAD software but they found themselves incompetent in the use of structure analysis package programs. In the study conducted by [21], a questionnaire was applied to the senior students of the Civil Engineering Department of Gazi University Faculty of Engineering in order to determine factors involved in selection of the graduation project and the project process and it was found out that very few students used programming language in their projects and majority of students did not want to use software programs. According to [26], it has been suggested that classes for teaching package programs becoming increasingly widespread at universities may lead to an extremely wrong and dangerous thought in students

that theoretical knowledge and classes are unnecessary and may, in turn, help engineers with a poorly developed theoretical foundation who are good at inputting data into package programs graduate from universities, causing a decrease in the quality of engineering services. In this study, it is emphasized that the necessary limit should be set for use of package programs in education programs, importance should be attached to the selection of package programs taught and the fact that these programs cannot replace the thought of engineering and an awareness should be raised in students. Improving students' ability to write programs in at least one computer language would be more beneficial in terms of improving the quality of engineering services.

This study emerged from the understanding that it would be beneficial for the employment of students to explore their interest and desire to learn package programs and to show the extent to which they benefited from computer technology. In this context, a questionnaire study was conducted in order to measure attitudes and skills of the students from the Department of Civil Engineering, Faculty of Technology, Isparta University of Applied Sciences for using the package programs related to their professional field.

The study, answers to the following questions were sought:

Among students of Civil Engineering:

1. What is their level of learning the computer software related to their field of profession?
2. What is their level of knowledge and skills about learning package programs?
3. What do they think about the inclusion of package programs in teaching?

2. STUDY GROUP

The study group of the research consists of 709 students studying in Civil Engineering Department, Faculty of Technology of Isparta University of Applied Sciences in the fall semester of 2018-2019 academic year. In this study, no sample selection was made and students in all classes were included in the research. However, only those who volunteer were included in the research for participation and no measurement tool was applied to those not wishing to take part. Demographic data of 311 students who participated in the study is given in Table 1.

Table 1. Demographic information of the students that participating in the research.

Variables	Categories	f	%
Gender	Male	244	78.5
	Female	67	21.5
Age	17-21	128	41.2
	22-26	169	54.3
	27-31	8	2.6
	32-36	6	1.9
Education	1. Education	179	57.6
	2. Education	132	42.4
Class	1. Class	55	17.7
	2. Class	44	14.1
	3. Class	97	31.2
	4. Class	115	37.0
	TOTAL	311	100.0

3. METHOD

In this study, the answer for the question "What are knowledge and skills of Civil Engineering Department students for using a package program in their field of profession and their attitudes towards learning?" was sought. Therefore, as a method, it was decided to use numerical data in order to reach large sample groups and to enable statistical evaluation in a short period of time. The study was limited to students studying at the Civil Engineering Department, Faculty of Technology of Isparta University of Applied Sciences.

Also, it was assumed that, during the study;

1. The students who answered the questionnaire would give sincere and objective answers to questions.
2. The sample would represent the population.

Permission was obtained from the Dean's Office of the Faculty of Technology of Isparta University of Applied Sciences for the application of the questionnaire. During the study, a questionnaire study focused on the students' learning and using competencies of the package program was planned and, at the stage of determining the questions of the questionnaire, related literature was screened and questionnaires conducted by [19], [20], [36], [8], [25], [9], [31], [23], [24] were reviewed and used for the purpose of preparing questions.

The questions were presented to the opinions of 2 experts from the Departments of Computer and Civil Engineering in order to assess the scope validity, robustness and safety of the questions, and questions found to be unnecessary in terms of scope, language and expression were removed following an examination based on feedbacks received from the experts and the questionnaire was given its final shape.

Questionnaire study is composed of 3 parts and 42 items with the first part being aimed at determining the personal details of participants (class, education, age, gender), the second part being aimed at measuring competence in terms of computer program use and learning level of computer programs, the third part being aimed at their perspectives about learning the use of the package program in the field of profession, their expectations of the software they want to learn, their suggestions on effective use of package programs in education and their attitudes for use of programs. Path three of the study consists of five point likert scale type options such as (1) I certainly agree, (5) I do not agree at all, which have a neutral central point and are considered to be the most practical method of measurement. The answers given to each item of the questionnaire were classified in the IBM SPSS Statistics 23.0 software program and represented by numerical values.

Frequency and percentage values were calculated to interpret the demographic part of the questionnaire. Since the part relating to questions “What are your wishes you would like to achieve when learning the package program? and “What is your opinion about use of package programs in your field of profession and teaching of it as a lesson?” is of the five-point Likert type, assessment range of their arithmetic mean was found to be 0.80. Accordingly, for the purpose of analysis of data: ranges such as 4.21-5.00 “I certainly agree”, 4.20-3.41 “I agree”, 3.40-2.61 “I neither agree nor disagree”, 2.60-1.81 “I don't agree”, 1.80-1.00 “I don't agree at all” were taken into account. Students' average scores of attitudes towards learning and using the package program were evaluated for each item based on these ranges. Findings about whether or not students' attitudes towards the use of package program showed a significant

difference according to gender were determined by t test. Findings about whether or not students' attitudes towards the use of package program in education showed a significant difference depending on the level of class were determined by ANOVA test.

The Cronbach Alpha internal consistency coefficient calculated for the reliability of the parts of the questionnaire regarding expectations from package program, usage and teaching perspective regarding the package program were calculated as 0.881 and 0.883, respectively. Accordingly, there is internal consistency between all items of the scale. According to the findings, factor analysis was conducted to determine the construct validity of the questionnaire and the factor loads ranged from 0.89 to 0.91, and the total variance under one factor was found to be 55.48. Factor loads of items included in the factor vary between 0,318 and 0,831. The factor loads of items in the questionnaire were found to be higher than 0,300. It can be said that it is sufficient in terms of construct validity. Kaiser-Meyer-Olkin (KMO) and Barllett's Test was found to be 0,915. It was ascertained that data are suitable for factor analysis.

4. RESEARCH FINDINGS

In this part, the findings obtained from the statistical analysis of the responses given to the questionnaires prepared for the use of package program by Civil Engineering Department students are given in tables. Table 2 shows students' general opinions about the items related to their expectations from package program education. Table 3 shows the general views of students regarding items concerning their standpoints about use of package programs related to their field of profession and teaching of such programs as a lesson.

Table 2. Views on the question "What are your wishes you want to be met while learning package program?".

What are your wishes you want to be met while learning package program?		**I certainly agree**	**I agree**	**I neither agree nor disagree**	**I don't agree**	**I don't agree at all**
1. Provision of practical solutions by it	f	218	82	11	-	-
	%	70.10	26.40	3.50	-	-
2. Turkish is its language	f	13.80	93	56	13	11
	%	44.40	29.90	18.00	4.20	3.50
3. It's easy to install	f	166	100	30	13	2
	%	53.40	32.20	9.60	4.20	6.00
4. It is easy to learn and comprehensible	f	183	96	25	5	2
	%	58.80	30.90	8.00	1.60	0.60
5. It's compatible with the computer hardware	f	186	97	23	3	2
	%	59.80	31.20	7.40	1.00	0.60
6. It accelerates the project and design process	f	196	91	21	3	-
	%	63.00	29.30	6.80	1.00	
7. Availability of the technical support service	f	196	85	28	1	1
	%	63.00	27.30	9.00	0.30	0.30
8. Regular updates	f	185	90	32	3	1
	%	59.50	28.90	10.30	1.00	0.30
9. It is affordable	f	214	62	27	8	-
	%	68.80	19.90	8.70	2.60	-

96.50% (300 students) stated that they wanted it to offer practical solutions while learning package program, whereas 3.50% (11 students) stated that they were undecided. 92.30% (287 students) expressed a positive opinion that it would accelerate the student project and design process and 1.00% (3 students) stated that this expression was not effective in learning the program.

Table 3. Views on the question "What is your opinion about use of package programs in your field of profession and teaching of it as a lesson?".

What is your opinion about use of package programs in your field of profession and teaching of it as a lesson?		**I certainly agree**	**I agree**	**I neither agree nor disagree**	**I don't agree**	**I don't agree at all**
1. It is useful to use package programs in vocational lessons.	f	198	87	24	1	1
	%	63.70	28.00	7.70	0.30	0.30
2. Theoretical and practical information can be used together with the package program.	f	164	109	36	1	1
	%	52.70	35.00	11.60	0.30	0.30
3. Package programs contribute to the learning process while practicing.	f	174	99	33	4	1
	%	55.90	31.80	10.60	1.30	0.30
4. Package program courses must be compulsory course.	f	144	83	69	13	2
	%	46.30	26.70	22.20	4.20	0.60
5. I have enough knowledge about package programs.	f	76	95	85	44	11
	%	24.40	30.50	27.30	14.10	3.50
6. I am in need of education on package programs.	f	147	102	49	10	3
	%	47,3	32,8	15,8	3,2	1
7. I keep abreast of package programs related to my field.	f	94	120	66	23	8
	%	30.20	38.60	21.20	7.40	2.60
8. I have gained basic knowledge about package programs for the first time at the university.	f	116	98	53	29	15
	%	37.30	31.50	17.00	9.30	4.80
9. I can learn to use a package program at the university.	f	119	117	58	12	5
	%	38.30	37.60	18.60	3.90	1.60
10. Even though I take package program lessons, I am unable to draw projects.	f	80	93	72	46	20
	%	25.70	29.90	23.20	14.80	6.40
11. I think that I am sufficient in terms of entering the project data into the program, analyzing and interpreting the results.	f	81	101	90	29	10
	%	26.00	32.50	28.90	9.30	3.20
12. I am more interested in classes related to package programs.	f	125	121	48	13	4
	%	40.20	38.90	15.40	4.20	1.30
13. A certain level of foreign language proficiency is required to learn the program.	f	147	115	45	3	1
	%	47.30	37.00	14.50	1.00	0.30
14. I have to have a good command of the program to advance in the professional field.	f	172	90	41	8	-
	%	55.30	28.90	13.20	2.60	-
15. I can improve myself on package programs after graduation.	f	135	105	55	11	5
	%	43.40	33.80	17.70	3.50	1.60
16. I can also learn the package program by myself without education	f	99	94	90	24	4
	%	31.80	30.20	28.90	7.70	1.30
17. I think that one is required to be knowledgeable about the package program for a job.	f	181	90	32	6	2
	%	58.20	28.90	10.30	1.90	0.60

91.70% (285 students) agreed that “It is useful to use package programs in vocational courses”, 7.70% (24 students) stated that they were undecided and 0.60% (2 students) stated that they did not agree. 87.70% (273 students) expressed positive opinion for the phrase “Package programs contribute to the learning process while practicing”, 10.60% (33 students) neither agreed nor disagreed and 1.60% (5 students) stated that it would not make a contribution. 73.00% (227 students) of the students agreed that “Package program courses should be compulsory course",

while 4.80% (15 students) stated that they did not agree and 22.20% (69 students) stated that they were undecided. 80.10% (249 students) stated that they needed education on package programs, whereas 4.20% (13 students) stated that they did not need education on package programs. 15.80% (49 students) stated that they were undecided. 75.90% (236 students) agreed with the phrase “I can learn to use a package program in the university” while 5.50% (17 students) stated that they did not. 18.60% (58 students) stated that they were undecided. 79.10% (246 students) stated that they were interested in the courses related to the package programs, while 5.50% (17 students) stated that they did not agree. 15.40% (48 students) stated that they were undecided. 62.00% (193 students) stated that they agreed with the item "I can learn the package program by myself without education." while 9% (28 students) stated that they did not agree with the idea that they could learn it by themselves. 28.90% (90 students) stated that they were undecided.

Table 4 shows Independent Sample t-test for the gender factor in order to measure their willingness to learn the package program according to independent variables and their skills and knowledge in using the program, whereas Table 5 shows one-way variance (ANOVA) analysis comparisons for comparison of their perspectives about learning to use the package program according to their class levels. Level of significance was taken as $p<0.05$.

Table 4. Distribution of students' views about their willingness to learn package program and teaching of it as a lesson according to gender variable and results of t test.

Items	Gender	n	$\overline{X}$	S	t	p
Would you like to learn a package program relating to your field of profession?	**Male**	244	1.71	1.115	1.607	0.109
	Female	67	1.48	0.841		
What are your wishes you want to be met while learning package program?	**Male**	244	1.58	0.579	2.114	0.033
	Female	67	1.42	0.409		
What is your opinion about use of package programs in your field of profession and teaching of it as a lesson?	**Male**	244	1.91	0.560	-0.248	0.804
	Female	67	1.92	0.527		

When the table was examined, there were no significant differences according to gender in the opinions of students about the items in parts of "Would you like to learn a package program related to your field of profession? ($P> 0.05$) and "What is your opinion about use of package programs in your field of profession and teaching of it as a lesson?". A significant difference was found in items relating to the group "What are your wishes you want to be met while learning package program?". Male students' willingness to learn package programs is higher than female students.($\overline{X} = 1.71$)($\overline{X} = 1.48$) Female students' attitudes towards using package programs and teaching of it as a lesson were better than male students with a little difference.($\overline{X} = 1.92$)($\overline{X} = 1.91$)

Table 5. Results of the one-way variance (ANOVA) analysis comparisons for comparison of their perspective differences about learning to use the package program according to their class levels.

Items	Class	n	$\overline{X}$	S	f	p
How did you learn to use computer software related to your field of profession?	1. Class	55	1.843	0.1012	1.813	0.145
	2. Class	44	1.780	0.1186		
	3. Class	97	1.818	0.0999		
	4. Class	115	1.801	0.1399		
Would you like to learn a package program relating to your field of profession?	1. Class	55	1.730	1.1130	2.003	0.114
	2. Class	44	1.390	0.7540		
	3. Class	97	1.580	0.9880		
	4. Class	115	1.810	1.1840		
What are your wishes you want to be met while learning package program?	1. Class	55	1.477	0.4629	0.950	0.417
	2. Class	44	1.472	0.4923		

Items	Class	n	$\bar{X}$	S	f	p
	3. Class	97	1.549	0.5576		
	4. Class	115	1.602	0.6011		
Opinion about use of package programs in your field of profession and teaching of it as a lesson	1. Class	55	1.972	0.5371	1.680	0.171
	2. Class	44	1.985	0.5183		
	3. Class	97	1.949	0.5544		
	4. Class	115	1.821	0.5650		

Tukey HSD test was conducted to determine the group in favor of which the difference was (Table 6-8). As seen in the tables, there was no significant difference between the opinions in the items according to the class variable ($p > 0.05$).

Table 6. Results of Tukey HSD test according to students' willingness for learning the package program and the class variable.

Class		Mean Difference	p
1. Class	2. Class	0.341	0.386
	3. Class	0.150	0.836
	4. Class	-0.081	0.966
2. Class	1. Class	-0.341	0.386
	3. Class	-0.191	0.754
	4. Class	-0.422	0.113
3. Class	1. Class	-0.150	0.836
	2. Class	0.191	0.754
	4. Class	-0.231	0.389
4. Class	1. Class	0.081	0.966
	2. Class	0.422	0.113
	3. Class	0.231	0.389

Table 7. Results of Tukey HSD test according to wishes of students they want to be met and the class variable.

Class		Mean Difference	p
1. Class	2. Class	0.005	1.000
	3. Class	-0.072	0.866
	4. Class	-0.125	0.509
2. Class	1. Class	-0.005	1.000
	3. Class	-0.076	0.870
	4. Class	-0.130	0.545
3. Class	1. Class	0.072	0.866
	2. Class	0.076	0.870
	4. Class	-0.053	0.896
4. Class	1. Class	0.125	0.509
	2. Class	0.130	0.545
	3. Class	0.053	0.896

Table 8. Results of Tukey HSD test according to students' point of view regarding field of profession and use of package program as well as teaching of it as a lesson and the class variable.

Class		Mean Difference	p
1. Class	2. Class	-0.013	0.999
	3. Class	0.024	0.994
	4. Class	0.152	0.335
2. Class	1. Class	0.013	0.999
	3. Class	0.037	0.983
	4. Class	0.165	0.331
3. Class	1. Class	-0.024	0.994
	2. Class	-0.037	0.983
	4. Class	0.128	0.333
4. Class	1. Class	-0.152	0.335
	2. Class	-0.165	0.331
	3. Class	-0.128	0.333

4. CONCLUSION

Today, analysis and design of building systems can be carried out with computer programs including advanced analysis techniques in accordance with international and earthquake regulations. It can be said that keeping abreast of programs related to the field of profession and having a good command of such programs would give the civil engineer an important advantage in terms of employment since the technological developments are so fast that the programs in this field will increase continuously and improve themselves.

Therefore, first of all, students' knowledge, skills and attitudes should be considered in order to enable civil engineering students to use computer package programs related to their professional fields in a beneficial and effective manner throughout and after their engineering education. In this study, it is aimed to investigate the interest and willingness of students of the civil engineering department in learning package programs.

Based on the data obtained from the study, it was determined that the students did not have enough information about the use of package programs. 80.10% (249 students) stated that they needed education on package programs whereas 4.20% (13 students) stated that needed no education. 15.80% (49 students) stated that they were undecided. 75.90% (236 students) stated that they agreed with the phrase "I can learn to use package program in university" and 5.50% (17 students) stated that they did not agree with this phrase. It was observed that students had positive attitudes towards the use and learning of vocational package program applications. 91.70% (285 students) of the students stated that it would be beneficial to use package programs in vocational classes. 87.70% (273 students) found positive the statement "Package programs contributed to the learning process while practicing" and 1.60% (5 students) stated that they did not think that it would make any contribution. 79.10% (246 students) stated that they were interested in classes related to the package programs, while 5.50% (17 students) stated that they did not agree with this. 15.40% (48 students) stated that they were undecided.

In this context, in order to increase students' interests and attitudes, it is thought that it would be useful if educational institutions improved their technological infrastructure to a possible extent throughout the education and taught basic principles of software as well as basic lessons in vocational classes. However, it should be emphasized that the student needs to examine, interpret and control the results obtained from the program at all times during the education.

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