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The influence of time management behaviours before starting general physics laboratory-I experiments on academic achievement in the course

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Abstract

The purpose of this study is to determine the time management behaviours before starting experiments in the laboratory environment and to find out whether such behaviours are influential on academic achievement in the laboratory course. Nine pre-service science teachers were observed for 9–11 minutes per week before starting experiments for 6 weeks. The findings were obtained through analysis of observation records and the time management behaviours before starting experiments by two domain experts. The pre-service teachers reading experiment leaflets prior to experiments were found to have a higher academic achievement level compared to those not reading them. In addition, a positive relationship was identified between academic achievement and the time management behaviour involving having textbooks, lecture notes and other sources about subjects present before experiments. Getting tools and materials before experiments, organising experiment desks, cooperation with groupmates and having experiment leaflets present were also found to influence academic achievement.

Keywords: Time management, academic achievement, general physics laboratory-I, pre-service science teachers.

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1. Introduction

Time is a universal and abstract concept that cannot be saved and taken back by living and non-living beings and whose even the smallest piece is priceless. Time is a valuable source and all beings seek ways to make more use of it. Especially, human beings develop new techniques to use time efficiently. Each era and culture have had their own understanding of using time. From the first existence of humanity to the present time, the tendency to use time efficiently through different techniques and means has increased. The first people used time in accordance with their needs and realised how important time was in agriculture, hunting and nomadic life (Whitrow, 1973). In the past, wide time ranges such as seasons, months and days were predominant, while today, even small time ranges such as seconds have become important to make use of any moment. Modern societies view and use time as a source of productivity and efficiency. Hence, controlling time has become important in every area. Time has become the most scientifically important factor in the processes of change in the world, and managers, economists and politicians have emphasised lack of time, irrevocability of time and shrinkage of time (Kirillov, Vinichenko, Melnichuk, Melnichuk & Lakina, 2015).

Recently, the use of time has gained much more importance in all areas of life compared to the past. As a result, the concept of 'time management' has emerged, and a lot of qualitative and quantitative studies have been carried out on it. Hellsten (2012) conducted a literature review on time management, examined a large number of studies about it and stated that there is no universal definition of it. While researchers studying on time management deliver some common views (e.g., setting goals, planning, organising), they have divided time management behaviours into different definitions and stages. According to Crutsinger (1994), time management includes setting goals, deciding on the most important event and ordering others around it. Kirillov et al. (2015) pointed out that the time management process consists of means, techniques and method, and that the stages of the time management process in the implementation of a series of tasks are purpose, distribution of tasks, analysis of the situations where time is spent, monitoring, setting priorities, preparing lists accordingly and summarising the results. Another researcher defined time management as the art of planning and timing to achieve a goal (Mohanty, 2003). Good use of time refers to establishing a good balance with the environment in meeting biological and physical needs (Koktas & Koktas, 2007). Drucker (1974) defined time as the most unique and the scarcest source. Schuler (1979) defined time as a process in which a person performs his or her tasks and attains his or her goals more effectively. Good time management refers to choosing to plan and organise in order to fulfil the behaviours and tasks that need to be done.

Studies on time management have focused on time management and the effective use of time. The common features of these studies can be grouped into the following three main stages: (1) setting priority goals and ordering them based on their importance, (2) timing and planning to achieve the goals and (3) organisation for the realisation of planning and timing (Adam & Jex 1999; Barkas, 1984; Bruning & Frew, 1987; Feeny Jonson, 2002; Higgins, 1986; Hellsten, 2012; Hellsten & Rogers, 2009; Jorde, 1982; Kearns & Gardiner, 2007; Kirillov et al., 2015; Lakein, 1973; Macan, 1996; Mackenzie, 1972; Morris, 2001; Morisano, Hirsh, Peterson, Pihl & Shore, 2010; Richardson & Rothestein, 2008; Seaward, 2004; Soucie, 1986; Wcolfolk, 1986). Research emphasises the following points to increase the efficiency of the stages: avoiding postponement and stress, re-setting priorities depending on the new situations, rewarding, segmenting the work to be done, creating new time habits, creating an effective working environment, determining the situations where time is spent, time estimation, time analysis and so on.

Today, time management can be considered as organising and performing the behaviours or required actions ordered in a specific time period based on priorities in a timely and goal-directed manner. Effective use of time refers to controlling time for the timely performance of the required behaviours in the order of importance and for an improved efficiency and productivity. Effective and

efficient use of time (i.e., time management) has become an important factor to fulfil the required tasks, behaviours and actions.

Time management has become the most important factor for scientific analysis in periods of change worldwide (Kirillov et al., 2015). To increase productivity in all areas of life (Britton & Tesser, 1991), time management studies first started in industry (Hellsten, 2012) and then studies were conducted in the field of education. Time management is performed by designing different techniques in different fields. In the field of education, time management is mainly addressed in the context of counselling services and its influence on academic achievement. Counselling services provided to students are one of the advantages of time management in education (Rowh, 2004). Zafarullah, Khawaja, Panhwar, Siddigui & Saeed (2016) stated that there is a direct relationship between students' learning performance and time management skills. The time management techniques applied by teachers have an influence on in-class performance (Khan, Farooqi, Khalil & Faisal, 2016). Several studies report that time management practices influence success (Britton & Tesser, 1991; Demirtas & Ozer, 2007; Campbell & Svinson, 1992; Macan et al., 1990; Misra & Mckean, 2000).

The General Physics-I course is put into practice through mechanical experiments in the General Physics Laboratory-I course. The present study tries to determine time management behaviours before starting experiments and the influences of these behaviours on academic achievement. The behaviours were formed based on expert opinions and the information about class management obtained from the literature. Accordingly, time management behaviours that should be performed before experiments were divided into three main groups: planning, laboratory rules and preparing experiment tools and materials. These behaviours are important for achieving the objectives of experiments. An experiment is the application and validation of the subjects covered in the classroom environment. West (1972) defined experiments as the verification of previously learned principles and facts. Time management skills related to preparation before experiments are important to carry out them effectively and attain relevant objectives.

2. Method

2.1. Research model

This study employed qualitative research techniques. Data were collected through semi-structured observation. According to Karasar (2005), data are directly obtained through observation, and the origin of all sciences is observation. Observation allows obtaining detailed and extensive information about behaviour (Baiey, 1987). The present study explored pre-service science teachers' time management behaviours before starting closed-end mechanical experiments included in the laboratory application of the General Physics-I course through non-participant (external) observation and investigated the relationship between such behaviours and academic achievement (academic performance) in the General Physics Laboratory-I course. Non-participant observation has high reliability and objectivity as it provides direct data. The present study involved an analysis of time management behaviours through non-participant observation data and an examination of the relationship between such behaviours and academic achievement.

2.2. Study group

The study group consists of nine pre-service science teachers receiving the General Physics Laboratory-1 course in a Department of Mathematics and Science Education Division of Science Education of a Faculty of Education in the fall semester of the 2017–2018 academic year. The study observed the pre-service teachers' time management behaviours before starting mechanical experiments, which were the applications of the General Physics-I subjects. The study group was formed by considering the pre-service teachers' attendance/absenteeism in the General Physics Laboratory-I classes.

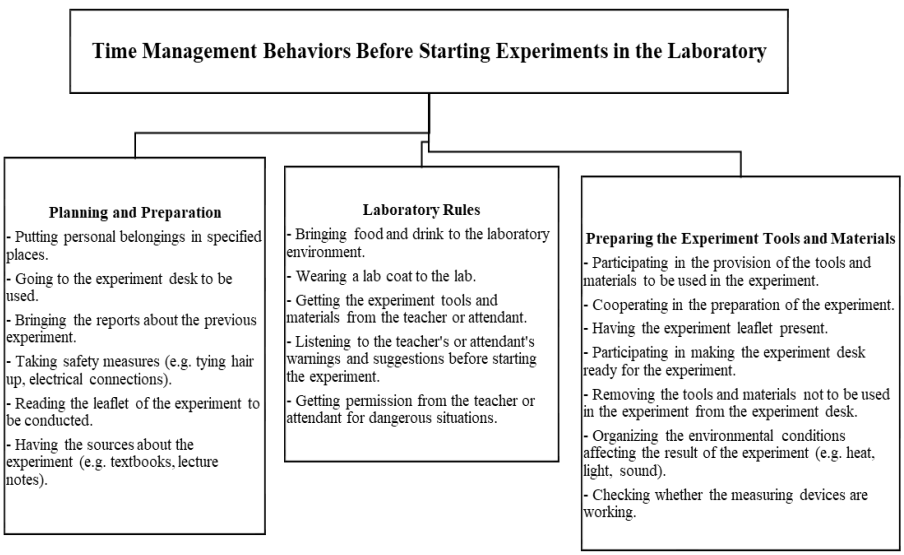
2.3. Data collection and analysis

Experiments are conducted in parallel with the General Physics-I course. The General Physics-1 subjects covered in the classroom environment are put into practice through experiments in the laboratory environment within the scope of the General Physics Laboratory-1 course the following week. Pre-service science teachers carry out the same experiment in groups of two or three every week. In the period covered in the present study, the pre-service teachers were provided with explanations about how to do the experiments, measurement, error estimation, preparation of experiment reports following the experiments, laboratory rules and things to do the first week. They started the experiments the second week and observations were conducted from the 3rd week to the 8th week. The observations were started as of the 3rd week because the delivery of the report of the conducted experiment 1 week later would be a time management behaviour, and adaptation to the laboratory environment and experiments was likely to influence the reliability of the data to be obtained from the observations. The pre-service teachers' time management behaviours before starting experiments were observed by the use of a tool (camera) for 6 weeks.

The behaviours to be performed before starting a lesson indicated by Erkilic (2005), such as planning and preparation, classroom rules, and preparing course tools, materials and sources were used for determining the time management behaviours before starting experiments. The instructors and attendants teaching the laboratory classes collected time management behaviours before starting experiments under three titles: planning and preparation, laboratory rules and preparing experiment tools and materials. Table 1 containing time management behaviours before starting experiments was created in light of the instructors' (domain experts') views about the behaviours required to be performed prior to the classes. The data obtained through the observations were subjected to content analysis by two experts based on the behaviours specified in Table 1. In this way, the pre-service science teachers' time management behaviours were determined for each week, and Tables 2–4 were created.

For the present study, the academic achievement score was determined as a sum of the scores obtained from pre-experiment questions, mid-term and final exam. It was obtained based on the assessment system set by the faculty. The weekly distribution of the pre-service teachers' observation periods was also created.

Table 1. Time management behaviours before starting experiments



3. Findings

The findings of the study involve the observations of nine pre-service teachers' (P_1, P_2, P_3,……………. P_9) time management behaviours before starting General Physics-I experiments in the laboratory environment from the 3rd week to the 9th week (for 6 weeks), the end-of-term General Physics-I academic achievement grades and the observation durations. Time management behaviours before starting experiments were collected under three groups: 'planning and preparation', 'laboratory rules' and 'preparing the experiment tools and materials'.

3.1. Findings concerning time management behaviours about planning and preparation

Table 2 is formed out of the data obtained through analysis of the observations concerning the pre-service teachers' behaviours about planning and preparation before starting experiments. Table 2 indicates that all the pre-service teachers, before starting experiments, put their personal belongings in specified places, went to the experiment desk to be used and brought the reports about the previous experiment for 6 weeks. The pre-service teachers except for P2 and P5 did not read the experiment leaflet (guide) involving information about the experiment tools and materials, installation, phases, procedures to be followed and blanks to be filled in. The experiment leaflet was not read by P6 for 6 weeks, by P1, P3, P7, P8 and P9 for 3 weeks and by P4 for 2 weeks.

The pre-service teachers except for P1, P6, P7, P8 and P9 had the sources about the experiment that could be needed during the experiment. P1, P7 and P9 did not have sources relevant to the content of the experiment for 2 weeks, and P6 and P8 for 1 week.

Table 2. The weekly distribution of the pre-service teachers' time management behaviours about planning and preparation

Planning and Preparation	3rd Week		4th Week		5th Week		6th Week		7th Week		8th Week	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Putting personal belongings in specified places.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Going to the experiment desk to be used.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Bringing the reports about the previous experiment.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	

Taking safety measures (e.g., tying hair up hair, electrical connections).	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Reading the leaflet of the experiment to be conducted.	P_2,P_3 P_4,P_5	**P_1,P_6 P_7,P_8 P_9**	P_1,P_2 P_4,P_5 P_7,P_8 P_9	**P_3 P_6**	P_1,P_2 P_3,P_4 P_5,P_7	**P_6 P_8 P_9**	P_2,P_3 P_4,P_5 P_7	**P_1 P_6 P_8 P_9**	P_2,P_4 P_5,P_8 P_9	**P_1P_3 P_4,P_6 P_7**	P_1,P_2 $P_4,P_5,$ P_8,P_9	**P_3 P_4 P_6 P_7**
Having the sources about the experiment (e.g., textbooks, lecture notes).	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7	**P_8** P_9	P_2,P_3 P_4,P_5 P_6,P_7 P_8,P_9	**P_1 P_9**	P_2,P_3 P_4,P_5 P_6,P_8 P_9	**P_1 P_7**	P_1,P_2 P_3,P_4 $P_5,,P_8$ P_9	**P_6 P_7**

All the pre-service teachers put personal belongings in specified places, went to the experiment desk to be used, brought the reports about the previous experiment and took safety measures before experiments. The pre-service teachers abstained from reading the experiment leaflet most. Only two pre-service teachers read the experiment leaflet for 6 weeks, while the other pre-service teachers abstained from reading it for 1–6 weeks. Most of the pre-service teachers had the sources about the experiment for 6 weeks, but four pre-service teachers did not have them for 1–2 weeks.

3.2. Findings concerning time management behaviours about laboratory rules

Table 3 is formed out of the data obtained through analysis of the observations concerning the pre-service teachers' behaviours about laboratory rules before starting experiments. Mostly, the pre-service teachers did not go to the laboratory with food and drink. Only P_6 violated that rule for 4 weeks. All the pre-service teachers wore a lab coat to the lab, got the experiment tools and materials from the teacher or attendant, listened to the teacher's or attendant's warnings and suggestions before starting the experiment and got permission from the teacher or attendant for dangerous situations (Table 3).

Table 3. The weekly distribution of the pre-service teachers' time management behaviours about laboratory rules

Laboratory rules	3rd Week		4th Week		5th Week		6th Week		7th Week		8th Week	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Bringing food and drink to the laboratory environment.	P6	P1,P2 P3,P4 P5,P7 P8,P9	P6	P1,P2 P3,P4 P5,P7 P8,P9	P6	P1,P2 P3,P4 P5,P7 P8,P9	P6	P1,P2 P3,P4 P5,P7 P8,P9		P1,P2 P3,P4 P5,P6 P7,P8 P9		P1,P2 P3,P4 P5,P6 P7,P8 P9

Wearing a lab coat to the lab.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9
Getting the experiment tools and materials from the teacher or attendant.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9
Listening to the teacher's or attendant's warnings and suggestions before starting the experiment.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9
Getting permission from the teacher or attendant for dangerous situations.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9

3.3. Findings concerning time management behaviours about preparing the experiment tools and materials

Table 4 presents findings concerning the pre-service teachers' time management behaviours about preparing the experiment tools and materials before starting experiments. All the pre-service teachers participated in the provision of the tools and materials to be used in the experiment, cooperated in the preparation of the experiment, participated in making the experiment desk ready for the experiment and removed the tools and materials not to be used in the experiment from the experiment desk for 6 weeks, except for P_8 and P_9 who abstained from these behaviours for 2 weeks. P_9 did not have the experiment leaflet present for 3 weeks, P_6 and P_8 for 2 weeks and P_1 and P_3 for 1 week. On the other hand, all the pre-service teachers organised the environmental conditions affecting the result of the experiment and checked whether the measuring devices were working.

Table 4. The weekly distribution of the pre-service teachers' time management behaviours about preparing the experiment tools and materials

Preparing the experiment tools and materials	3rd Week		4th Week		5th Week		6th Week		7th Week		8th Week	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Participating in the provision of the tools and materials to be used in the experiment.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7	**P_8** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_9	**P_8**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8	**P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Cooperating in the preparation of the experiment.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_9	**P_8**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8	**P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7	**P_8** **P_9**
Having the experiment leaflet present.	P_2,P_4 P_5,P_6 P_7,P_8 P_9	**P_1** **P_3**	P_1,P_2 P_3,P_4 P_5,P_7 P_8	**P_6** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6,P_7	**P_8** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_7	**P_6** **P_8** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Participating in making the experiment desk ready for the experiment.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7	**P_8** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7	**P_8** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Removing the tools and materials not to be used in the experiment from the experiment desk.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_9	**P_8**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9		P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8	**P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7	**P_8** **P_9**	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	
Organising the environmental	P_1,P_2 P_3,P_4		P_1,P_2 P_3,P_4		P_1,P_2 P_3,P_4		P_1,P_2 P_3,P_4		P_1,P_2 P_3,P_4		P_1,P_2 P_3,P_4	

conditions affecting the result of the experiment (e.g., heat, light, sound).	P_5,P_6 P_7,P_8 P_9	P_5,P_6 P_7,P_8 P_9	P_5,P_6 P_7,P_8 P_9	P_5,P_6 P_7,P_8 P_9	P_5,P_6 P_7,P_8 P_9	P_5,P_6 P_7,P_8 P_9
Checking whether the measuring devices are working.	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9	P_1,P_2 P_3,P_4 P_5,P_6 P_7,P_8 P_9

3.4. Findings concerning academic achievement and observation durations

The pre-service teachers' academic achievement grades were determined based on the grade calculation system of the faculty. Answers to the questions about the experiment asked by the instructors before or during the experiment and evaluations of the experiment reports were included in the academic achievement grade. It also involved mid-term and final exams in certain percentages. All of them made up the General Physics-I Laboratory academic achievement grade. The pre-service teachers' academic achievement grades varied from 58 to 82 out of 100. The average duration of observation of the pre-service teachers (per experiment) before experiments was 9–11 minutes. The total duration of observation was 595 minutes. Table 5 presents findings concerning the pre-service teachers' academic achievement grades and durations of observation.

Table 5. The durations of observation of the pre-service teachers before starting experiments and their end-of-period academic achievement grades in the laboratory course

The pre-service teachers conducting the experiment	End-of-period academic achievement grade in the laboratory course	The total durations of observation before starting experiments for 6 weeks
P_1	71	66 minutes
P_2	82	70 minutes
P_3	74	66 minutes
P_4	70	60 minutes
P_5	80	73 minutes
P_6	62	64 minutes
P_7	64	68 minutes
P_8	58	70 minutes
P_9	64	58 minutes

4. Results and discussion

4.1. Results and discussion concerning time management behaviours about 'planning and preparation' before starting experiments

Before starting experiments, nine pre-service teachers put personal belongings in specified places, went to the experiment desk to be used, brought the reports about the previous experiment and took safety measures. Seven pre-service teachers did not read the experiment leaflet for 1–6 weeks. P_2 and P_5 read it every week. As shown in Table 5, the academic achievement grades of P_2 and P_5 were 82 and 80, respectively. They were higher than the grades of other pre-service teachers. The academic achievement grade of P_6 who did not read the experiment leaflet most (for 6 weeks) was 62, while the academic achievement grades of P_1, P_3, P_7, P_8 and P_9 who did not read the experiment leaflet for 3 weeks were 71, 74, 64, 58 and 64, respectively, and the academic achievement grade of P_4 who did not read it for 2 weeks was 70 (Table 5). Since experiment leaflets contain the objectives of experiments, their forms, how to do them, tools and materials used and questions for the evaluation of experiment results, reading the experiment leaflet before starting increases the efficiency of the experiment and enhances academic achievement. Getting prepared for laboratory classes is important to know the concepts about the experiments and the procedures to be followed in the experiments before starting (Meester & Maskill 1995; Rollnick, Zwane, Staskun, Lotz & Green, 2001).

The academic achievement grades of P_2, P_3, P_4 and P_5 having the sources about experiments every week were 82, 74, 80 and 70, respectively. Those of P_1, P_7 and P_9 who did not have them for 2 weeks were 71, 64 and 64, respectively, whereas those of P_6 and P_8 who did not have them for 1 week were 62 and 58 (Table 5). The academic achievement grades of the pre-service teachers who had the sources containing conceptual knowledge about the experiments and involving explanations about the subjects were higher than those of the pre-service teachers not having them. It can be said that there is a significant relationship between academic achievement and the time management behaviour having the sources about the experiment.

Among the time management behaviours about planning and preparation, 'reading the leaflet of the experiment to be conducted' and 'having the sources about the experiment (e.g., textbooks, lecture notes)' positively influence academic achievement. Reading the stages of the experiment and knowing the experiment scenario allow conducting the experiment successfully. The accomplishment of the experiment objectives positively influences academic achievement. This is consistent with the literature. There is a positive relationship between academic achievement and planning and organisation skills (Liu, Rijmen, MacCann & Roberts, 2009). Preparations involving having relevant sources to the content of the experiment facilitate reaching conceptual and theoretical knowledge during the experiment. The use of conceptual and theoretical knowledge during the experiment improves the permanence of knowledge. This increases success in mid-term and final exams involving conceptual and theoretical knowledge. The students preparing for laboratory classes well are more likely to gain laboratory skills (Gregory & Di Trapani, 2012). Those who manage time well are those who prefer to make plans and organise things (Williams, Verble, Price & Layne, 1995).

4.2. Results and discussion concerning time management behaviours about 'laboratory rules' before starting experiments

All the pre-service teachers except for P_6 displayed the time management behaviours about laboratory rules. P_6 brought food and drink to the laboratory for 4 weeks. That pre-service teacher's academic achievement grade was 62 (Table 5). It is difficult to mention a relationship between bringing food and drink to the laboratory and academic achievement.

The present study found no relationship between the pre-service teachers' academic achievement in the General Physics Laboratory-I course and paying attention to time management behaviours about laboratory rules before starting experiments. Almost all of the pre-service teachers (i.e., both

those with high academic achievement and those with low academic achievement) fulfilled time management behaviours about laboratory rules. This may be because the attendants emphasised the things to do in the laboratory environment during the first week and imposed certain sanctions for the pre-service teachers to attend the classes. The pre-service teachers generally fulfilled time management behaviours about laboratory rules by observing the instructors' warnings. For example, the pre-service teachers who wanted to go into the laboratory environment without a coat were not accepted to the classes by the instructors. As a result, the pre-service teachers had to wear a coat to the laboratory.

4.3. Results and discussion concerning time management behaviours about 'preparing the experiment tools and materials' before starting experiments

P8 and P9 did not participate in the provision of the tools and materials to be used in the experiment, cooperate in the preparation of the experiment, remove the tools and materials not to be used in the experiment from the experiment desk and participate in making the experiment desk ready for the experiment for 2 weeks. Their academic achievement grades were 58 and 64, respectively (Table 5). Their academic achievement grades were lower than those of the pre-service teachers displaying the above-mentioned behaviours for 6 weeks. Hence, the said time management behaviours displayed before starting experiments were seen to be influential on academic achievement. Time management is described as a process of fulfilling a series of tasks (Kirillov et al., 2015). There is a relationship between time management behaviours and academic achievement (Britton & Tesser, 1991; Lahmer & Zuluaf, 2000; Simons & Galotti, 1992). Organising the experiment desk and making it ready for the experiment contribute to conducting the experiment and attaining the learning objectives. Pre-laboratory preparation facilitates students' learning (O'Brien & Cameron, 2008). Uysal (1999) stresses that organising is a time management behaviour, and disorganisation is a time trap. The management behaviour 'removing the experiment materials not to be used in the experiment from the experiment desk' prevents pre-service teachers conducting the experiment from being distracted. The pre-service teachers get more concentrated on the experiments, which positively influence their academic achievement.

P_1 and P_3 did not have the experiment leaflet present for 1 week. Their academic achievement grades were 71 and 74, respectively. P_6 and P_8 did not fulfill that behaviour for 2 weeks, and their academic achievement grades were 62 and 58, respectively. Not performing this behaviour for 3 weeks, P9 had an academic achievement grade of 64 (Table 5). As shown in Table 5, having the experiment leaflet present every week, P_2, P_4, P_5 and P_7 had academic achievement grades of 82, 70, 80 and 64, respectively. As the pre-service teachers had the experiment leaflet ready, their academic achievement increased. As shown in Table 2, the time management behaviour 'reading the experiment leaflet before the experiment' was only fulfilled by P_2 and P_5 every week, and their academic achievement grades were found to be higher than those of others (Table 5). Having the experiment leaflet present and reading it before the experiment have similar positive influences on academic achievement.

5. Conclusion

The time management behaviours before starting experiments that were found to be influential on the pre-service teachers' achievement in the General Physics Laboratory-I course in the present study are listed below:

1. Reading the experiment leaflet before the experiment (under the category of planning and preparation).
2. Having the textbook about the experiment, lecture notes and other sources about the subjects (under the category of planning and preparation).

3. Organising the experiment desk and making it ready (under the category of preparing the experiment tools and materials).
4. Having the experiment leaflet present (under the category of preparing the experiment tools and materials).

A significant relationship was found between academic achievement and the time management behaviour 'reading the experiment leaflet before the experiment'. It is reported that effective time management is important for success in a lot of areas (Puffer, 1989). Some time management behaviours before starting experiments in the General Physics Laboratory-I course influence academic achievement in the course.

5.1. Recommendations

Importance should be attached to time management behaviours before starting experiments to improve the efficiency of the Physics-I experiments. Extensive studies may be carried out by obtaining the views of pre-service teachers who have received the course before for determining time management behaviours before experiments. Studies may be carried out in wider time ranges by lengthening research duration. The efficiency of experiments may be improved more by carrying out new studies through determining time management behaviours before, during and after experiments.

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