








Efficiency Determinants of Educational Wastage Programs

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Abstract

COVID-19 pandemic lockdowns converted traditional face-to-face teaching practices to online processes, resulting in thousands of students losing out on accessibility to education. The educational wastage program was introduced to enable students to recover their abilities and to improve their skills. The objective of this research is to study the determinants of such programs, including the inputs and the outputs. The teachers who participated in this program formed the population of this study; the random sample included 1500 teachers, both males and females. The collected questionnaire responses were downloaded into the SPSS software. The results show that time management is the most important factor that affects output of the recovery programs in educational wastage. The second factor that affects output of the recovery programs is the subjects introduced. Teachers' participation in formulating such recovery programs is considered very important to improve output. The study recommends the participation of teachers in formulating recovery programs.

Keywords: Educational wastage, COVID-19, Recovery educational programs, Efficiency, Teachers, Time management.

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Contribution of this paper to literature

This paper contributes to literature on improving education wastage programs through identification of factors that affect this process. The paper will help in the implementation of EW program designs after the COVID-19 pandemic.

1. Introduction

Jordan like other countries suffered from the COVID-19 pandemic in all aspects of life, including education. Government regulations on procedures to restrict the spread of the disease shifted to online teaching practices. Consequently, the Ministry of Education (MoE) created the National Education Platform which is used to conduct lessons for students at all levels. The MoE introduced ways for lessons to be conducted using formal TV channels. These practices were carried out during the education year 2020/2021. Subsequently, students faced various challenges in following the online lessons. One major problem in some areas was the availability of the internet, while in others it was the quality of the internet. In many households, especially the poor ones, the availability of electronic tools to access the lessons was a serious problem. On reaching the stable pandemic stage with low infection rates, the government started to open up different sectors, including physical educational activities. Due to the previous difficulties faced in online learning, the government suggested the implementation of educational wastage programs to improve students' achievement in courses such as mathematics, English and Arabic languages and science.

The term educational wastage has been in use for a long time. The use of this term was limited to countries facing difficulties in providing physical learning facilities to students in specific areas. The term usage was renewed recently after the COVID-19 pandemic. The regularity of the term's usage increased in many countries, especially countries that were not able to provide regular educational activities online for students during the different stages of the pandemic. Research is currently centered on models that lead to integrated educational wastage programs that increase the capacity of students at different levels (Deribe, Endale & Ashebir, 2015; Kayode, Akinyemi & Gbesoevi, 2014 and Matage, Kyalo & Saina, 2015).

The discussion of time management follows two ways; the first direction is related to students while the second is related to courses on education wastage programs. The part related to students is concerned with the time lost on attending education wastage courses (EWC). The time given for students to enjoy their summer holidays is used to attend the recovery courses. This change in the time factor affects the students' inclinations towards accepting the volume of information given during the EWC; time management is considered one of the important factors that affect teaching efficiency (Mupa & Chinooneka, 2015). The effective use of time in teaching provides students a good chance to understand the curriculum and recover the wasted material (Penn-Edwards et al., 2012). Time management should be related to the material that is to be covered by the educational wastage program.

Time management of online courses is considered very important for both students and teachers. Time management concentrates on the products of the educational process (Goodson, Miertschin & Stewart, 2016). Moreover, time management includes the interest to finish tasks within the planned time within the scheduled financial resources (Bond & Feather, 1988; Burt & Kemp, 1994). In education, the teachers care about the time to finish the courses outlines, while the students care about finishing their tasks and achieving considerable academic success through online training. These two objectives should meet at some stage to produce successful online teaching and learning outcomes.

Time management in education has been reported to interfere with students' success (Goodson et al., 2016). Students with good time management through online courses and with a high ability for self-direction were found to have good results in different courses (Goodson et al., 2016; Shepperd & Eagle, 2002). The students with poor time management were not found to be able to complete online courses. Thus, time management skills need to be assessed for both teachers and students in online courses; addressing this aspect will improve the outcomes of online teaching and learning at all times.

A very important point raised in time management is the time needed to cover course outlines in person and in online teaching. Students' follow-up on online teaching is given less attention by teachers with inadequate practice; this increases the availability of time to cover the course outline and less time is needed to complete its coverage. These issues require good experience from teachers to manage and control time (Strongman & Burt, 2000; Vodanovich & Seib, 1997). The use of time in online classes should take into consideration both the effective time required to go through subjects and the students' achievements in these subjects. During the COVID-19 pandemic in Jordan, the practice of using online training was introduced for the first time, which created different challenges of varying levels among teachers to control and manage time. Moreover, the preparations for online teaching were another challenge in time management in online teaching. This issue is raised in the current research.

Education material used for online courses should fit this type of teaching (Cuesta, 2010). Education material design of online courses should concentrate on the students' needs and the targets of the educational program. Designing and introducing online teaching material should pass different stages including the analysis of students' needs, the design of the material to meet these needs, the development of the material, the proper procedures that can be used to implement the material and the evaluation process of the online teaching activities (Spector, 2015). At the time of COVID-19, the education material used remained in its traditional format without any changes, which put the suitability of these materials under question. This paper discusses this issue of measuring the suitability of the material for online education using EWP.

Educational material used in EWC should have specific criteria to meet the expectations and the objectives of these programs. The objectives should be announced to teachers before the programs supersede them. The material that should be covered should meet the objectives of the program too. Tsoumpri et al. (2016) reported that curriculum should be monitored and evaluated regularly to ensure the educational output. This should be applied to the EWP, which should measure the knowledge gained by students from the EWP and how it is linked to the upper grades to integrate and reinforce the benefits gained by students. Moreover, the more the variety of courses included in the EWP, the harder it is to achieve the different objectives.

Financial resources are very important for the success of educational wastage programs (EWP). The national EWP at the time of COVID-19 should ensure allotting financial sources to meet the expenses required for the teaching process, including teachers' compensations as these programs are held during the summer holiday. In this regard, Dangara (2016) reported that financial resources should be managed accordingly to succeed in EWP. The lack of sufficient financial resources can shift the programs away from their objectives. The objective of this paper is to investigate the efficiency of the educational wastage programs introduced by the MoE to compensate for online teaching gaps in governmental schools.

2. Methodology

In Jordan, the educational wastage program (EWP) was introduced as an integrating program to compensate for and improve students' skills due to the problems faced in online teaching during the COVID-19 pandemic lockdowns. So, the objective of this study is to examine and identify the key factors that contribute to the success of the educational wastage programs. To accomplish the objective of this research, a questionnaire was used as the tool to collect data. The questionnaire was composed of two parts; the first part was designed to collect information on teachers' demographics while the second part was used to collect information about EWP time management, the sufficiency of course materials introduced (SCMI), integration of courses and the capacity of facilities which represent the independent variables that form the EWP constraints. The dependent variables include students' achievements, material coverage and linking wastage programs to upper grades. A five point Likert scale was used, where 5 indicated the highest agreement and 1 reflected the lowest agreement. The questionnaire was distributed to educational experts to measure its validity. The reliability analysis of the questionnaire was measured using Cronbach's alpha using a pilot sample of 50 parents. The analysis of reliability to measure the consistency of the questionnaire is shown in Table 1. The results show that the alpha values are more than 0.6 which is the acceptable limit for such social studies (Hair, Celsi, Money & Samouel, 2007).

Table 1. The questionnaire consistency using Cronbach's alpha.

Variables	Alpha value
Independent Variable: Educational Wastage Program Constraints	0.95
Time management efficiency	0.92
Course material sufficiency	0.89
Variety of courses covered	0.78
Facilities capacity	0.93
Dependent variable: Output	0.94
Students' achievement	0.85
Time for material coverage	0.86
Link of introduced material to upper grades	0.84

The final questionnaire was distributed to a random sample of government school teachers. The random sample included 1500 teachers from different areas. Due to the lockdowns, the questionnaire was designed electronically and published through Google forms, while the follow-up on teachers' responses to the questionnaire was carried out physically through field visits to the schools. The collected questionnaire database was cleaned and entered into SPSS (Ver. 26) for analysis. Descriptive statistics were used to reach the demographic characteristics of the sample to find the frequencies and percentages. Means and standard deviations were used to measure the teacher trends for the study variables. Differential statistics were applied to test the hypothesis of this research. Structural equation modeling was used to test the strength and attitudes for the effect of IV on DV in the study. Structural equation analysis was executed after running the normal distribution analysis of the different items and excluding the non-normal distributed items and running factor analysis to determine which items were capable of measuring each variable.

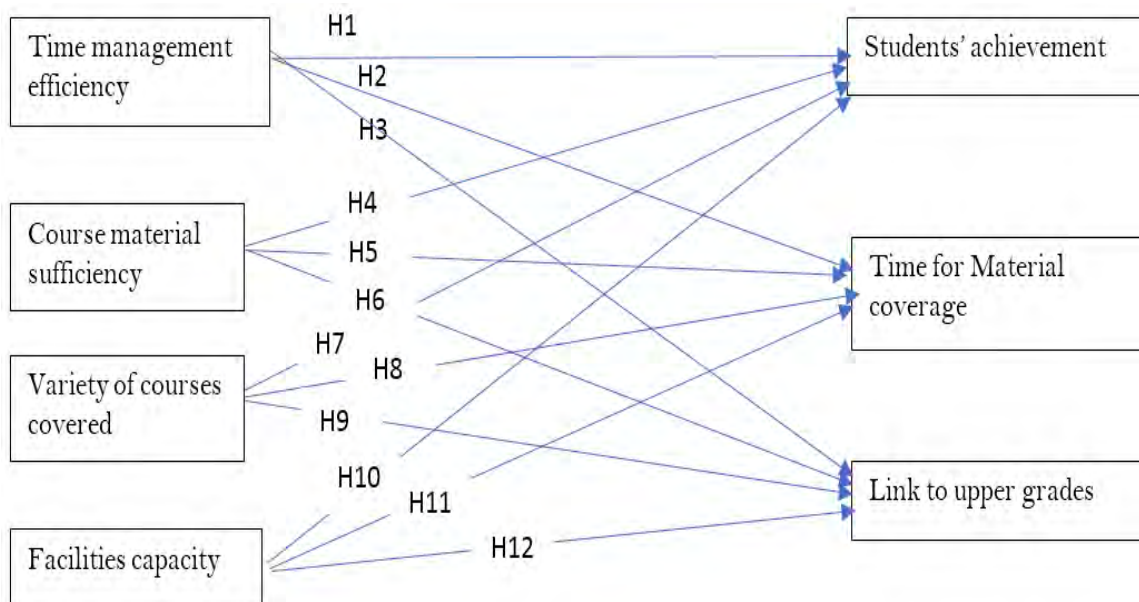


Figure 1. Study research model based on literature review.

Figure 1 explains the relationship between the inputs of EWP and the expected output of the EWP introduced for students to recover pandemic-lost education.

3. Results

The study showed that the response of females to the questionnaire (65.3%) was more than males (34.7%). This may reflect the higher concern of females for EWP. The sample ages varied. The age groups who responded to the questionnaire were 30-40 years (45.1%), followed by the age group of 41-50 years (35.4%) and the lowest responses came from the age groups of less than 30 years (15.2%) and more than 50 years (4.3%). This shows that the middle aged group teachers were more interested to participate in the EWP (Figure 2).

In terms of educational qualifications, 87.6% had a bachelor's degree, while the rest of the sample had a diploma (2.1%), master's degree (5.1%) and Ph.D. degree (6.2%). As for the place of residence, a big number of the sample was living in urban areas, while only 4.8% were in rural areas. In the area of experience, the teachers with 5-10 years experience (41.2%) topped the group, followed by the teachers with less than 5 years of experience (35.2%) and those with 10-15 years of experience made up the lowest at 15.1%. The young teachers were more encouraged to participate in the program as there was a financial incentive for the participants.

3.1. Teacher Trends in Efficiency Inputs in EWP

The educational wastage program was announced and decided in a short period of time. The program was introduced to integrate and reinforce students' knowledge in different courses as the original teaching was conducted solely online in all areas during the COVID-19 lockdown. The benefits of online teaching were limited as there were barriers faced, including the lack of internet in some areas in Jordan and the lack of laptops, tablets or smart phones to receive and respond to online teaching. The evaluation of online teaching was not very encouraging by households and parents as they were not satisfied with the extent of knowledge gained by the students.

The primary reaction of teachers to EWP varied from being encouraging to hopeless in terms of primary satisfaction with the time devoted to the program. Thus, this paper investigates the teachers' points of view of the program after its completion to measure the suitability of the program design and its reflection on the students.

In the evaluation, the efficiency standard of time management of the program was intermediate ($m=3.22$, $sd=0.961$). The highest score was awarded for adequacy of time to complete the designed material of the course ($m=3.45$, $sd=1.21$). The progress of students to enable effective use of time was intermediate ($m=3.31$, $sd=1.25$). Teachers' evaluation showed that they dropped some topics of the outline to be able to cover all the material due to time restrictions ($m=3.22$, $sd=1.22$), while the time given was shown to be too short to carry out short quizzes and exams to measure students' gain from the material ($m=3.11$, $sd=1.22$). The evaluation of the consideration of time when designing the program was negative ($m=2.90$, $sd=1.21$).

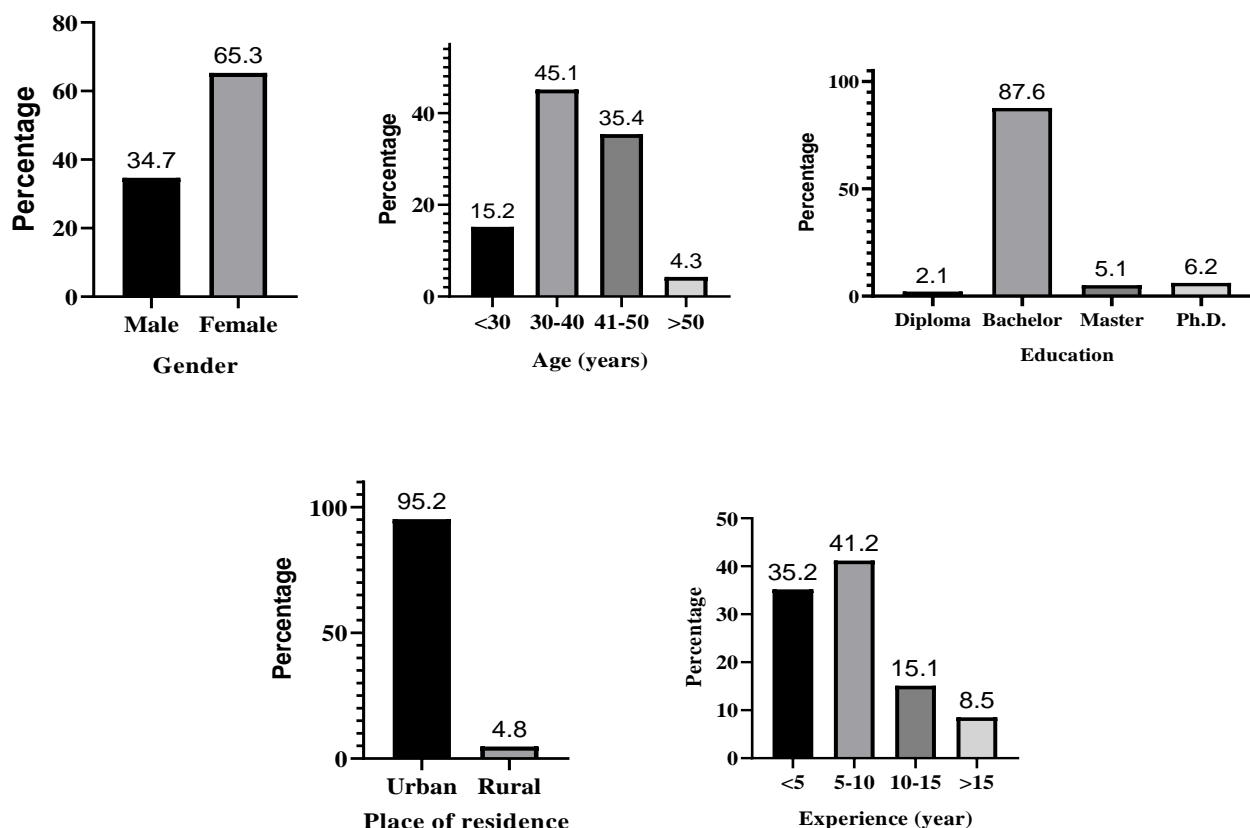


Figure 2. Demographic characteristics of the teachers.

Table 2 shows the teachers' trends on the efficiency of EWP inputs. The evaluation of the course material indicates higher efficiency ($m=3.46$, $sd=0.913$) compared with time management. This positive evaluation is a result of the teachers' evaluation that the introduced subjects are important to enhance students' knowledge in different courses. The highest evaluation is seen in the sufficiency of materials provided to compensate for online teaching ($m=3.61$, $sd=1.17$). The second highest evaluation shows that the material provided considered the different levels of students ($m=3.55$, $sd=1.17$). The balance in compensating material to cover both semesters is in the third position ($m=3.55$, $sd=1.17$) while accomplishing the goals of EWP is in the fourth position ($m=3.49$, $sd=1.24$). The lowest level of efficiency is in providing feedback about the material quality ($m=3.48$, $sd=1.24$).

The question on the variety of courses covered was raised as the program concentrated only on science courses and paid no attention to literary material, on the assumption that students can cover these materials without intensive help. So, the evaluation of the variety of courses covered was moderately low ($m=3.29$, $sd=0.854$). The

highest evaluation was for the inclusion of essential subjects in the courses ($m=3.57$, $sd=1.15$). The courses took into consideration the subjects that should be covered to help students deal with the courses introduced in the upper grades ($m=3.52$, $sd=1.07$). The lowest evaluation was for crossing out the subjects of the different courses in the material ($m=2.97$, $sd=1.19$). This process, though necessary, was not made possible due to the lack of time and also the high pressure placed on teachers to manage their classes.

Table 2. Teacher trends in the efficiency of EWP input.

Items	Code	Mean	St. Dev.
Time management efficiency	TME	3.22	0.961
The time given for EWP was sufficient to cover the materials of the course	T1	3.45	1.21
The progress of students increased the time required for the course	T2	3.31	1.25
I dropped some topics in order to complete the program on time	T3	3.22	1.20
The time was sufficient to conduct quizzes and exams	T4	3.11	1.22
The time requirement for the execution of the EWP was considered fully	T5	2.90	1.21
Course material sufficiency	CMS	3.46	0.913
The material included was enough to compensate for the online teaching	C1	3.61	1.17
The material considered the different levels of students	C2	3.56	1.17
The material was sufficient to cover two semesters	C3	3.55	1.17
The material accomplished the goals of the EWP	C4	3.49	1.17
Feedback was provided about the material quality	C5	3.48	1.24
Variety of courses covered	VCC	3.29	0.854
The courses in the program included the important subjects	V1	3.57	1.15
The subjects in each course were varied to cover the necessary information for the higher grades	V2	3.52	1.07
The school modified courses to include the most relevant material	V3	3.46	1.09
The course supervision was carried out regularly throughout the execution of the program	V4	3.33	1.07
The courses overlap through the material introduced	V5	2.97	1.19
Facilities capacity	FC	3.25	0.93
The number of students per course was suitable for the available space	F1	3.38	1.15
The financial resources were sufficient to apply to the practical parts of the courses	F2	3.32	1.13
The number of teachers was enough to cover the introduced courses	F3	3.27	1.14
The facilities were well prepared to receive the students in this program	F4	3.25	1.18
The compensation offered to teachers was suitable with the effort and the time period of the program	F5	3.09	1.16

The facilities capacity evaluation was moderate ($m=3.25$, $sd=0.93$). The registration of students to the program was voluntary and the teachers' participation was voluntary too. So, the number of students per session increased to match the number of teachers who participated in the program. This placed pressure on teachers and facilities at the same time. The number of students per session was high ($m=3.38$, $sd=1.15$), which increased the load, and the financial resources were not available to apply to the practical parts of the courses and increase the number of teachers in the program.

3.2. Teacher Trends in the Output of the EWP Program

Table 3 presents the teacher trends in the efficiency of the EWP outputs. The previous evaluation of the inputs was moderate, which justifies the moderate outputs of the program. Students' achievements in the program were moderate ($m=3.35$, $sd=0.88$), but the achievement was higher compared with online teaching ($m=3.43$, $sd=1.21$) because of the response and follow up. Homework and exams improved the achievement of students and the program in general enriched the achievement of students ($m=3.29$, $sd=1.19$).

The evaluation of time and material covered through the program was moderate ($m=3.20$, $sd=0.90$). Time was critical throughout the program to cover all required material ($m=3.41$, $sd=1.03$), also the time limited the success of the program ($m=3.29$, $sd=1.14$). The use of time was balanced by teachers to cover most of the material ($m=3.11$, $sd=1.21$) and the negative evaluation was in the flexibility of distributing time according to the needs of different subjects ($m=2.90$, $sd=1.21$).

Table 3. Teacher trends in the efficiency of EWP outputs.

Items	Code	Mean	St. Dev.
Students' achievement	SA	3.35	0.88
The students gained sufficient information through the program	S1	3.69	1.08
The achievement of students was higher compared with online teaching	S2	3.43	1.21
The homework was a good tool to measure the achievements	S3	3.41	1.03
The exams at the end of the program were a good tool to reflect achievements	S4	3.40	1.18
The EWP program enriched the achievements of students	S5	3.29	1.19
Sufficiency in material cover time	MCTE	3.20	0.90
Time was critical to ensure the students gained all required information	M4	3.41	1.03
Time was the mean measure of the success of the program	M3	3.29	1.19
Sufficient time to execute the EWP	M5	3.27	1.14
Through the execution of the course, time was distributed equally among subjects	M1	3.11	1.21
The teacher had the flexibility to allocate time according to needs	M2	2.90	1.21
Link to upper grades	LUG	3.26	1.03
The teachers concentrated on the material required for upper grades	L3	3.38	1.15
The program considered the upper grades	L1	3.32	1.13
I contacted others in upper grades about the importance of the material	L2	3.09	1.16

The results show that teachers linked the material of the program with upper grade requirements ($m=3.26$, $sd=1.03$). The materials needed for upper grades were emphasized by teachers ($m=3.38$, $sd=1.15$), and these issues were introduced in the program ($m=3.32$, $sd=1.13$). The last evaluation was on the teachers determining the priority of subjects for upper grades ($m=3.09$, $sd=1.16$).

3.3. Educational Wastage Program Model

To study the determinants of the success of EWP, confirmatory analysis was used. Normal distribution analysis was used to exclude the items that did not satisfy the normal distribution conditions, using skewness and kurtosis in SPSS. Factor analysis was conducted to measure the ability of items to measure each variable. The results showed that all items had loading factors of more than 0.4, reflecting their suitability to measure the variables (Hair et al., 2007). Amos was used to test the study model shown in Figure 3.

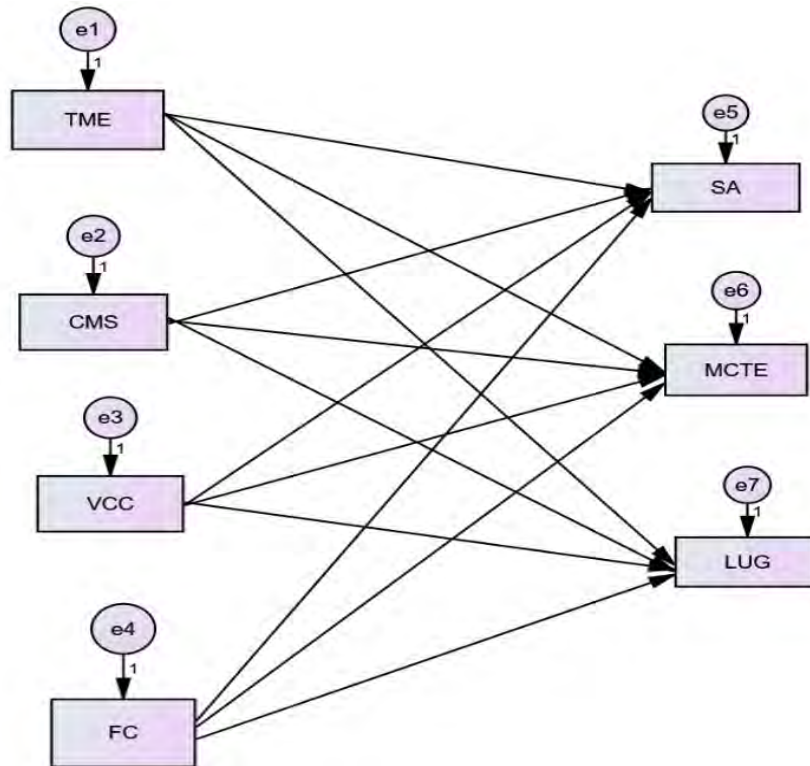


Figure 3. The research model used in the confirmatory analysis.

Figure 4 shows the results of the confirmatory analysis of the study model. The results show that the model is significant (Chi-square=1843.47, $p<0.001$). The model fitness shows $GFI=0.591$, $AGFI=0.272$, $TLI=0.143$, $CFI=0.633$ and $RMSEA=0.569$. According to Hair et al. (2007), the results satisfy the model fitness.

The results of the regression weight of the different variables are shown in Figure 4 and Table 4. The results show that the highest significant effect is for the facilities' capacity on the link with upper grades ($RW=0.921$). This may associate with the number of students per class which limit the introduction of the link. The second highly significant (0.629) effect is for time management efficiency on the best time required to cover the material (MCTE). The results show that the TME is significant on LUG (0.130) and SA (0.181). On the other hand, the variety of courses covered (VCC) affected both the student achievement (0.315) and the best time required to cover the program material (0.088). The effect of facilities capacity affected student achievement (0.386), the best time required to cover the material (MCTE) (0.188) and the link to upper grade courses (0.921).

Table 4. Regression weights: (Group number 1 - Default model).

Relationship	Estimate	S.E.	C.R.	Prop
SA <--- TME	0.181	0.019	9.647	***
MCTE <--- TME	0.629	0.016	40.508	***
LUG <--- TME	0.130	0.016	8.057	***
SA <--- CMS	-0.003	0.020	-0.156	0.876
MCTE <--- CMS	-0.007	0.016	-0.424	0.671
LUG <--- CMS	-0.014	0.017	-0.823	0.411
SA <--- VCC	0.315	0.021	14.923	***
MCTE <--- VCC	0.088	0.017	5.015	***
LUG <--- VCC	-0.023	0.018	-1.243	0.214
SA <--- FC	0.386	0.019	19.942	***
MCTE <--- FC	0.188	0.016	11.736	***
LUG <--- FC	0.921	0.017	55.317	***

Note: *** Highly Significant.

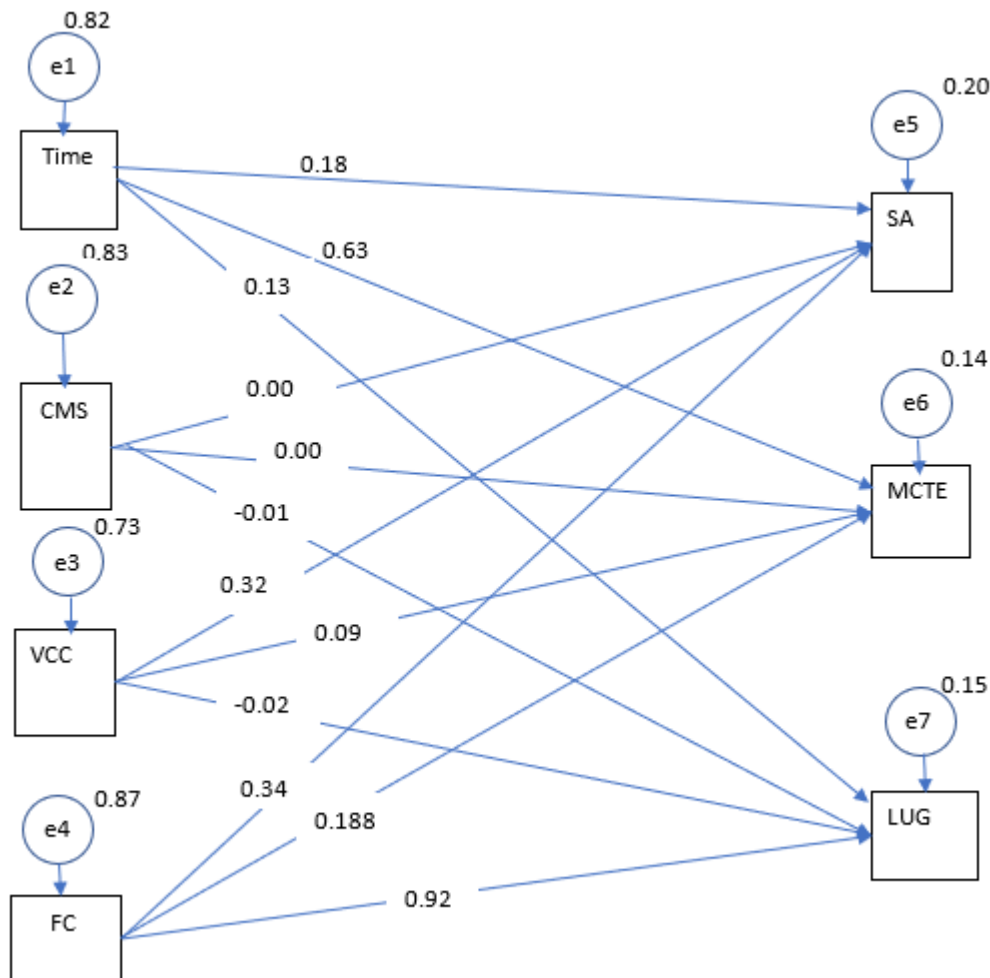


Figure 4. The regression coefficients for the effect of IV on the DV of the model.

4. Discussion

Wastage educational programs require early and deep investigation to figure out the gaps in the educational system (Bernard & Orodho, 2017). Also, wastage was described as the internal inefficiency of the educational system (Ajayi & Mbah, 2008). The causes of educational wastage include many factors resulting from living and economic conditions, as listed by UNESCO (2014). During the COVID-19 lockdowns, wastage of educational processes and the ensuing complaints became public, which resulted in this issue becoming one of national concern. This situation called for the MoE to kick start a national educational wastage program to improve the student's skills at the end of the lockdown period. The program was launched by the Ministry without giving due consideration to the weak areas suffered by students. The current paper evaluates this program and its output, including the determinants of its success.

The study includes a wide range of demographic characteristics and experiences to measure the variations in points of view for the evaluation of the EWP. In general, the results show that the teachers did not interfere with the designs of the material and they were given a specific time to end the program to avoid overlaps with the coming educational year. Parrello, Iorio, Carillo and Moreno (2019) reported that teachers are highly capable of determining the problems facing the teaching process. So, the absence of teacher participation and feedback provision from this program reduced the benefits and the outputs.

The most important determinant of the program that affected output is the time given and the subjects covered for each course. The results show that the subjects introduced required more time for coverage. This justifies the fact that time is one of the determinants for the introduction of such programs. Akinsolu (2017) pointed out that wastage recovery is dependent on different factors including student ability, school nature and social factors which determine the required time to cover different subjects in the wastage recovery programs. The time allocated for the program was not enough to encourage the introduction of quizzes or exams. This was another problem faced by the program to recover the educational wastage resulting from COVID-19 online teaching programs.

Moreover, facilities should be provided to make a success of the educational waste recovery programs. The obligatory joining in such programs will compel all teachers and students to join, but voluntary registration is affected by the minimum resources and limited benefits to the students who register in the program, which lower students' opportunity to join if the parents or the surrounding factors play a role in their absence. Also, the absence of teachers participating in the program results in the process being not comprehensive as the seriousness of the program is lost.

The results show that the strongest determinants of the program are time management and the extent of subjects and courses introduced. Time management introduces the teachers to the roadmap that covers the different subjects. When the roadmap is introduced according to subjects, it provides a good chance to have good coverage of the subjects based on the time stipulated to complete the program.

5. Conclusions and Recommendations

The objective of this study is to figure out the limitations of the educational wastage programs resulting from COVID-19 online teaching programs. The results show that good planning of the programs determine the extent

of their success. The most critical elements of planning include time management and introduction of subjects. Early preparation by teachers and good supervision improve the opportunities for the success of such programs. The study recommends that the time planned for such programs should be sufficient to study the outputs and teachers should be involved in the planning to ensure success.

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