

Comparative analysis of the results of multigrade and singlegrade classes based on indicators of educational productivity and efficiency: A case study of Bandar Abbas city primary and secondary schools

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ABSTRACT

Research on multigrade in comparison to singlegrade classes often overlooks the issues and challenges facing the nation's educational authorities in administering these classes. The purpose of this study was to compare multi and singlegrade classes in terms of educational efficiency and effectiveness. The population of this study consisted of all students, parents, teachers and principals of schools in Bandar Abbas city in the academic year 2017-18. A researcher-made questionnaire was used to collect educational productivity data. The findings of the study showed that there was no significant difference between self-esteem of the two groups of students but in terms of social skills and social development, students in the multigrade classes were better off. In terms of educational efficacy, singlegrade student's survival rate was better but there was no significant difference between the two groups in terms of promotion and repetition rate.

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1. INTRODUCTION

In spite of the fact that education has significance role in the formation of social, cultural and economic capital and the growth and development of societies, the educational system achieves its goals for various reasons. It faces numerous challenges; one of them is the existence of a significant number of schools and multigrade classes. Multigrade classes occurs in primary education when a teacher has to teach two or more primary school student grades during one timetable period in the same class. It is the teaching of students of different ages, grades and abilities in the same group [1-5].

Handling one grade with students from diverse family backgrounds, ethnic/linguistic traditions, and socio-economic circumstances and with different ability levels is difficult enough. Combining more than one grade in a multigrade context is challenging and even more difficult. Teachers fell isolated and uncertain about what is expected of them in conducting lessons in their multigrade classrooms. For children to learn effectively, teachers need to be well trained, well resourced, and able to meet highly demanding teaching tasks and to hold positive attitudes to multigrade teaching [4-8]. According to Hyry-Bihammer and Hascher [9] teachers need special skills to organize instruction in their heterogeneous classrooms. They point out that in successful multigrade teaching practices, the heterogeneity of students in taken into account and cultivated.

The existence of multigrade classes has been an inevitable fact everywhere because of the limitation of the number of teachers and the lack of time to start and end their studies and to create opportunities for development of each student [10, 11]. Due to the increasing trend of rural migration to cities and the quorum of the number of students in the villages to form independent classes in these areas, increasing the number of these classes will be inevitable in the future. Studies on the effectiveness of teaching in single and multigrade classes indicate that, if done well, depending on the full potential of the students in the multigrade classes, results will be equal to or sometimes better than singlegrade classes. For example, Imamzadeh [11] found that multidisciplinary classes were successful and considered as an effective alternative organization to singlegrade classes. And when it comes to impact on student performance, it is important to say that multigrade class organization appears to be much stronger, and the intrinsic performance and efficiency of multigrade students is higher than singlegrade students [12-14]. Berry [15] lists four advantages of multigrade teaching, all of them non-cognitive:

(1) Student tend to develop independent work habits and self-study skills. (2) Cooperation between different age groups is more common resulting in collective ethics, concern and responsibility. (3) Students develop positive attitudes about helping each other. (4) Remediation and enrichment activities can be more discreetly arranged than in normal classes (p. 8).

Even though much of the research speaks of success of multigrade classes but there are studies that indicate mixed evidence regarding the effects of multigrade classes on student achievement. Sometimes multigrade teaching is seen as a poor substitute for monograde teaching [16, 17]. For example, Mariano and Kirby [18] state:

(a) Students in the multi-grade classes do not appear to learn more or less than their counterparts in the single-grade classes. No consistent differences were found with respect to reading, mathematics, language, or composite scores. The median effect size across the 34 studies for which effect size could be computed was essentially zero. (b) Students in multi-age classes did not learn more or less than students in the single-age classes. The median effect size for the 8 studies for which effect size could be computed was again essentially zero. (c) However, with respect to noncognitive outcomes, students in both the multi-age and multi-grade classes tended to score as well as or higher on attitudes towards schools, personal adjustment, and self-concept than students in the single-grade classes, although the differences in both cases were rather small (p. 2).

According to Little [19], millions of learners worldwide are taught by teachers who are responsible for two or more school grades per year. She states, "In many countries multi-grade classes arise out of necessity and are regarded as second class education. Yet in some parts of the world learning and teaching in multigraded settings is embraced as the pedagogy of choice, offering equivalent, and sometime superior, learning opportunities" (p. 1). In multigrade classes, students are taught according to their developmental stage [20-22]. As Hyry-Beihammer and Hascher point out decisions about students learning in such classes are based on the learning support they individually require. The success of multiage education also depends on teaching techniques [23, 24].

Today's educational systems are organized by age, grade and level of students. This organization is divided into single and multigrade classes. One of the most ideal classroom conditions is singlegrade classes but some conditions make the training system more conducive to the formation of multigrade classes. In different parts of the world, different names such as "multilevel" classroom, "composite" or "combination" classes, "double" classes, "split" classes, "mixed-age" classes, "vertically grouped" classes, "multiple" classes, "family" classes, "unitary schools" or "multilevel" classes have been used for teaching these classes at different levels. The multigrade class is not very favorable to teachers and educators and according to Mulryan-Kyne [25] teachers tend to employ instructional practices that are not likely to facilitate effective teaching and learning but under certain circumstances, it seems necessary to use these classes. Due to the low population density, the decline in student enrollment, the lack of teachers, and the economic reasons it is necessary to consider the use of multigrade classes [26]. In general, it can be argued that a model must be provided for the educational system to accelerate the achievement of the ultimate goals of school education, as well as ways to increase efficiency and productivity in schools. Therefore, the question of this study was to determine the efficacy and productivity of multigrade and singlegrade classes from the point of view of teachers, principals, parents and students.

2. RESEARCH METHOD

The data collection instrument selected for this study was a questionnaire developed by the researcher. The data collection tool was four researcher-made questionnaires for teachers, principals, parents, and students in relation to their future perspective in determining the components of productivity (self-esteem, social development, and social skills) of multi and singlegrade school students from

the combination of the three standard questionnaires: (a) self-esteem from the Cooper Smith standard questionnaire, (b) social skills from the Inderbitzen and Foster questionnaire, and (c) social growth from the Wineland questionnaire. Also, to evaluate the performance of students in multi and singlegrade classes past documents (promotion rate, rejection rate, completion rate, and retention rate) were used. It should be noted that social skills require learning experiences and learning processes while social growth takes place by itself and does not require social relationships.

The participants in this study consisted of all teachers, principals, parents and students in single and multigrade schools from Bandar Abbas city in 2017-2018 academic year. The sample size (380) was selected based on Morgan Table and cluster random sampling method was used among teachers, principals, parents and students of multigrade (189) and singlegrade (89) elementary schools in district 1 of Bandar Abbas city. Before using the measurement and data collection tools, it was necessary to ensure the reliability and validity of the questionnaires. In an effort to ensure content validity, faculty from this university, with expertise in the area of multi and singlegrade classes, were asked to review the questions. All agreed that the items represented important elements hypothesized in this study. Therefore, all items were retained. For its reliability, at first, 30 questionnaires were distributed and Cronbach's alpha coefficient was calculated as 0.78. After analyzing the data by Kolmogorov-Smirnov test, to find out if the data were normal, using inferential statistics with respect to the measured variables and data available for data analysis, the Univariate and ANOVA statistical methods were used.

3. FINDINGS

Table 1 shows the average number of participants from different groups, with a total of 180 students, 12 principals, 65 teachers, and 123 parents. The Kolmogorov-Smirnov test was used to test the normality of the data distribution. The significant was higher than 5%, indicating a normality of data. Given the normality of the data distribution, which was determined by the results of Kolmogorov-Smirnov test, ANOVA tests were used to investigate this issue. In order to answer the research questions, the productivity variable, namely self-esteem, social skill and social growth were studied in two groups of multi and singlegrade classes. The results of the t-test are presented in Table 2.

Table 1. Average number of participants

Groups	Frequency	Percentage
Students	180	47.36
Principals	12	3.15
Teachers	65	17.10
Parents	123	32.36

Table 2. Independent samples t-test

Variables	Types of Classes	F	Mean	SD	t-test	Level of Significance
Self-esteem	Singlegrade	246	3.46	10.46	0.785	0.082
	Multigrade	134	3.26	11.41		
Social skill	Singlegrade	246	3.55	0.185	6.243	0.000
	Multigrade	134	3.72	0.142		
Social growth	Singlegrade	246	4.01	5.20	3.76	0.000
	Multigrade	134	4.98	3.69		

The results of Table 2 indicate that there is a significant difference between two groups of multi and singlegrade classes in the two indices of social growth and social skills with significance level of 0.000. And in these two indices, teaching in multigrade classes performed better than singlegrade classes. Also, a significance level of 0.082 for self-esteem indicates that there is no significant difference between the two groups. And the teaching performance is the same in both multi and singlegrade classes. The ANOVA test was used to find the answers to questions 1 to 4 that were considered for the different productivity groups in the multi and singlegrade classes. The results are presented in Table 3 and Table 4.

Table 3. Results of one-way ANOVA

Source of variation	Sum of Square	DF	MS	F	Sig. Level
Between group	0.957	3	0.319	2.317	0.081
Within group	11.846	377	0.138		
Total	12.804	379			

Table 4. Results of post hoc test (Bone Fereni)

Response Level (I)	Response Level (J)	Differences (I-J)	SE	SIG	CI 95%	
					Lower Bond	Upper Bond
Principal	Teacher	0.13438	0.08248	0.368	-0.0817	0.3505
	Parents	0.28685	0.15178	0.240	-0.1108	0.6845
	Student	0.46130	0.26876	0.322	-0.2429	1.1655
Teacher	Teacher	0.13438	0.08248	0.368	-0.3505	0.0817
	Parents	0.15247	0.15206	0.748	-0.2459	0.5509
	Student	0.32692	0.26892	0.619	-0.3776	1.0315
Parents	Teacher	-0.28685	0.15178	0.240	-0.6845	0.1108
	Parents	-0.15247	0.15230	0.748	-0.5509	0.2459
	Student	0.17445	0.29758	0.936	-0.6052	0.9541
Student	Teacher	-0.46130	0.26876	0.322	-1.1655	0.2429
	Parents	-0.32692	0.26892	0.619	-1.0315	0.3776
	Student	-0.17445	0.29758	0.936	-0.9541	0.6052

Based on the results of the ANOVA test for the levels of the respondents and their level of reasoning about evaluating the productivity of the multi and singlegrade classes, we concluded that with respect to the significance level of 0.081, the null hypotheses was not rejected. That is, the level of reasoning between groups is confirmed. And based on these results, there was no significant difference between the groups in evaluating the efficiency between the multi and singlegrade classes. Four indicators of promotion rate, repetition rate, and maturity rate have been used to evaluate the effectiveness of multi and singlegrade classes. The t-test of variance was used for these variables. The results are presented in Table 5 to Table 8.

1) How is the upgrade rate in multigrade classes compared to singlegrade classes? The t-test was used to obtain the result of this question. The study of this variable between the two groups showed that there was no significant difference between the rate of promotion of the multigrade classes with that of singlegrade classes and the criteria of the two communities were equal.

Table 5. Independent t-test for promotion rate

	Variance Test		Independent t-test				
	F	sig	T	DF	sig	Lower limit	Upper limit
Equality of variance assumed	0.114	0.633	-0.715	38	0.347	-0.43990	0.25840
Not equality of variance assumed			-0.715	37.99	0.347	-0.43990	0.25840

2) What is the base failure rate of multigrade classes compared to singlegrade classes? The t-test was used to obtain the result of this question. The study of this variable between the two groups showed that there was a significant difference between the repetition rate of the multigrade classes and the singlegrade classes and the criteria of the two communities were not equal and the mean of the repetition rate in the multigrade classes was more than the singlegrade classes.

Table 6. Independent t-test for basic repetition

	Variance Test		Independent t-test				
	F	sig	T	DF	sig	Lower limit	Upper limit
Equality of variance assumed	0.155	0.698	2.311	14	0.021	0.01342	0.5037
Not equality of variance assumed			2.311	13.99	0.021	0.01342	0.5037

3) What is the drop-out rate in multigrade classes compared to singlegrade classes? The t-test was used to obtain the result of this question. A study of this variable between the two groups showed that there was no significant difference between the dropout rates for multi and singlegrade classes and the two communities' criteria were equal.

Table 7. Independent t-test for dropout rate

	Variance Test		Independent t-test				
	F	sig	T	DF	sig	Lower limit	Upper limit
Equality of variance assumed	0.250	0.618	-0.582	18	0.462	0.7558	0.04235
Not equality of variance assumed			-0.582	17.99	0.462	-0.7558	0.04235

4) What is the survival rate (average length of study) in multigrade classes compared to singlegrade classes? The t-test was used to obtain the result of this question. The results of this study showed that there was a significant difference between the survival rate of multigrade classes and those of singlegrade classes.

Table 8. Independent t-test for survival rate

	Variance Test		Independent t-test				Lower limit	Upper limit
	F	sig	T	DF	sig			
Equality of variance assumed	0.177	0.585	2.212	179	0.002	0.1342	0.4536	
Not equality of variance assumed			2.212	178.9	0.002	0.1342	0.4536	

4. DISCUSSION AND CONCLUSIONS

In spite of data that show that a large number of primary school children learn in multigrade classes in both the developed and underdeveloped world, there has been considerable debate around the perception that multigrade education is a less desirable educational strategy [27]. Research shows that in developing world where multigrade classes are predominant, particularly in the rural and remote areas, these classes are practical and address the issues of many small rural schools which do not have sufficient numbers of children to offer separate classrooms and teachers for each age group [28, 29].

The results of this study showed that the parameters and productivity indices according to ANOVA and T-test were significantly different between the two groups. The findings of previous researches are consistent with the findings of this study. The differences in productivity and efficiency of multigrade and singlegrade classes are important. First, there is a significant difference in terms of social productivity and social skills in the multigrade classes compared to the singlegrade classes. Students in multigrade classes are more exposed to group work than singlegrade classes, in language and mathematics have made more progress and boys who are considered as low achievers seem to learn more than girls in the same classes [30, 31].

Second, according to the self-esteem index, there was no significant difference between the multi and singlegrades classes, and the educational efficiency of these two self-esteem teaching styles was equal. Although the students in the multigrade classes in the self-esteem subscale had a higher average than the students in the singlegrade classes, it can be clearly stated that the results of this study are in line with the results of other studies. Farahani [32] concluded that integrated education had an effective role on students in elementary schools. This means that elementary school students are better off academically than singlegrade school students. In their research, Soleimani, Hadadian and Shahrabi [33] sought to compare students in multi and singlegrade classes in terms of social skills and academic achievement. The results of their research showed that there was a significant difference between the academic achievement of multi and singlegrade students in the four courses of science, geography, Persian and mathematics. They also found that there was a significant difference between the level of social skills of single and multigrade students, and that this was in favor of students in the multigrade classes. Kadirvar, Navabi Nejad and Emmzade [34] also found that there was a considerable positive effect of multigrade classes on children's social skill. Rahimi, Mofedi and Pakdaman [35] at there was a significant difference between the social growth scores of students in multigrade and those of singlegrade classes. The social grades of students in multigrade classes were higher than the grades of students in singlegrade classes.

Regarding the results on the efficiency of the multi and singlegrade classes, the current research showed that there was a significant difference between the two teaching styles based on two indicators of repetition and failure rate. There was no significant difference between the promotion and the dropout rate between multi and singlegrade classes. The results on the internal efficacy of multi and singlegrade classes were consistent with those of Farahani.

There are numerous benefits to multigrade classes. Learning in these classes is deeper, as students often interact with other students in a group setting. The results of this study can be useful for teachers, education planners, principals, and educational authorities to identify the role of productivity and efficacy in the academic achievement of multigrade students. In general, based on previous research and also the results obtained in this study, it can be said that education in multigrade classes is a factor for social skills development.

Given the current conditions of the ruling system of society and the lack of financial resources due to economic sanctions and the resulting tensions, any revision of educational conditions (restoration and development, etc.) is beyond the reach of the current budget. Any change that needs to be sustained requires extensive financial resources and this has no place in the current planned development budget. As a result, one should expect fundamental changes in the economic system of society that provide the resources needed for the cultural transformation of society.

Data collected in this study is not representative of what happens in all schools in Iran. Nevertheless, the study does give a limited view of what happened in Bander Abbas city from the perspective of teachers, students, parents and principals and offers insights, which may be explored in further research and be useful generally to planners and practitioners.

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