

Educational Effects of an Online Learning Program of Economically Disadvantaged Potentially Gifted Elementary Students

Jiyoung Ryu

KAIST, Global Institute for Talented Education
193 Munji-ro, Yuseong-gu, Daejeon, South Korea
+82-42-350-6228
jryu01@kaist.ac.kr

Jiseon Kim

KAIST, Global Institute for Talented Education
193 Munji-ro, Yuseong-gu, Daejeon, South Korea
+82-42-350-6222
jskim315@kaist.ac.kr

ABSTRACT

This research investigates the educational effects of online-integrated science program for economically disadvantaged 6th grade students. There were two classes with different learning methods: one with only the online-mentor and the other with both online and onsite mentors. The students received self-esteem scale and academic self-efficacy test at the very first and last class of the program. As a result, students showed positive alteration of self-esteem and academic self-efficacy after the program, meaning this program is effective at developing student's self-esteem and academic self-efficacy. This proposes that more education programs should be provided in order to raise underprivileged students with high potential into outstanding individuals.

CCS Concepts

•Applied computing → Education → E-learning • Social and professional topics → Professional topics → computing education → K-12 education.

Keywords

Economically disadvantaged students; online-learning program; Mentoring; Potentially gifted students

1. INTRODUCTION

Studies say that economically disadvantaged student with potential has high possibility of being an underachieved gifted without even noticing its own talents due to deficient chance of proper education [1]. Even though these students are outstanding prodigy, due to their poverty, cultural difference, geographical isolation, disability or other various reasons, they cannot receive quality education, and are underrated [2]. A study proposed the necessity of distinctive approach for economically disadvantaged students in order for them to fully demonstrate their talents [3]. This is because these students have less chance of basic education, and might have unique psychological, social problem due to marginalization. In Korea, expansion of gifted education for

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.

ICEEL 2017, November 2–4, 2017, Bangkok, Thailand

© 2017 Association for Computing Machinery.

ACM ISBN 978-1-4503-5377-9/17/11...\$15.00

DOI: <https://doi.org/10.1145/3160908.3160923>

underprivileged children is one of the major strategies of gifted education, and studying with online-mentor is one of the methods. This learning method makes students learn through online. After studying a session in a website for underprivileged gifted students, students submit their assignment online, then online-mentor grades the assignment and gives feedbacks. The advantage of this learning method is that it has no limit to time and location. Online-education is highly preferred, since considerable amount of underprivileged students live in geographically isolated region or no gifted education provided.

Thus, this research has a goal of examining the educational effects of online-education for economically disadvantaged students. The specific study goals are as follows.

1. Is there a difference of self-esteem after the online education program?
 - 1) Are there differences of self-esteem after the online education program in two learning methods?
 - 2) Are there differences of self-esteem after the online education program in genders?
2. Is there a difference of academic self-efficacy after the education program?
 - 1) Are there differences of academic self-efficacy after the online education program in two learning methods?
 - 2) Are there differences of academic self-efficacy after the online education program in genders?

2. LITERATURE REVIEW

2.1 Underprivileged Gifted Students

Generally underprivileged refers to social minority groups to the mainstream. However in gifted education, it refers to students with potential talent but with limited chance of gifted education [4]. Most of underprivileged gifted students do not get the proper gifted education, and cannot fully demonstrate their potential. They might show a significant achievement with proper education provided. Unfortunately, some of these students slip from the general gifted education selection system due to unfavorable procedure and tools to them, cultural difference or other reasons.

The deficient gifted education that economically disadvantaged students experience is not because of their parent's low income, but rather it is highly due to parent's lack of anticipation in their children, education value, and expectation to gifted education [5].

That is, parent's low income is not the direct reason. It is the parent's characteristic that caused low income giving the negative effects to child's development of potential and academic achievement [6].

Nevertheless, students with high resilience show outstanding achievements despite poor condition of poverty. This shows that poverty is not necessarily always giving negative effects [7]. Also students who achieved greatly even though in low social and economic status, showed higher self-esteem, open-mindedness to new experience, and community solidarity than average students [8].

2.2 Self-Esteem

Self-esteem is an overall assessment of its own value [9]. Self-esteem is a psychological factor that greatly affects individual's development, character formation, and social adjustment [10]. It is a very important notion that is related to self-confidence, motivation, and self-control [11].

2.3 Academic Self-Efficacy

Academic self-efficacy is learner's confidence in one's own ability to organize and practice academic tasks. Person with high academic self-efficacy chooses challenging tasks [12], endeavors more to successfully finish given tasks [13], and sedulously continue the task despite the hardness [12].

3. RESEARCH METHOD

3.1 Participants

We identified 68 economically disadvantaged 6th graders who regarded as having potential in math and science from personal essay and teachers' recommendation in nationwide. 37 boys and 31 girls, 68 students in total, participated in this research. 8 boys and 12 girls received 10 online-sessions with only the help of online-mentor. 29 boys and 19 girls received 10 online-sessions with the help of both online mentor and onsite teachers.

Table 1. Research Participants

Online learning Method	Male	Female	Total
w/t online mentor	8	12	20
w/t online mentor + onsite teachers	29	19	48
total	37	31	68

3.2 Research Procedure

This research was proceeded in steps shown in <Figure 1>, in order to examine the educational effects of online-education program. After selecting 68 6th grade students from all over the country, ten online classes were given for ten weeks, each class a week. At the very first and the last class, students received self-esteem scale and academic self-efficacy test, and then the mean differences were analyzed. The 10 online-education sessions' topics are STEAM to stimulate interest and motivation in science, as shown in Table 2. There were two experiment groups: one with just the online-mentor giving feedbacks (20 students) and another with both online mentors and onsite teachers (48 students).

All 68 students participated in both pre- and post-tests. The result was analyzed with SPSS Version 22.0, verifying the mean differences of self-esteem and academic self-efficacy on learning methods and genders, after online education program.

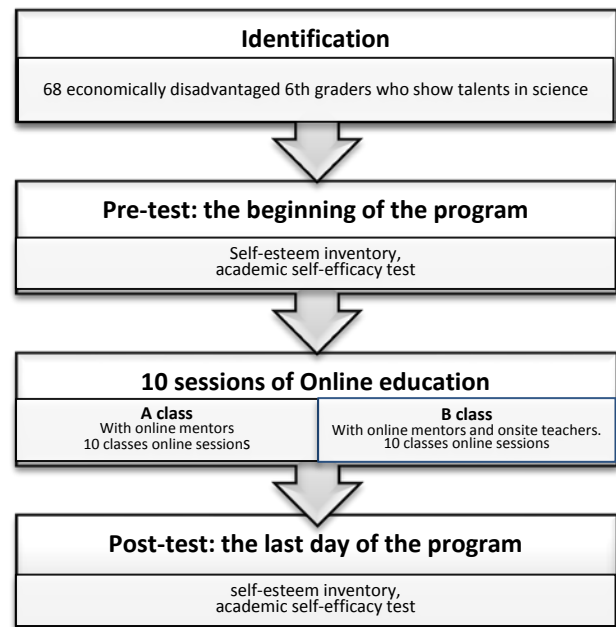


Figure 1. Research Procedure

Table 2. Theme of online classes

Sessions	Subject	Theme
1	Number and Operation	I have one name. but how many names the number have?
2	Figure	Adventure of spiral
3	Electricity and magnetics	My homopolar animation
4	Material characteristics	Jungle law! How to survive in uninhabited island!!
5	Regularity	Truth or lie! World of truth and lie with regularity and number of cases
6	Data and possibility	Poster recipe with neighborhood statistics !
7	Integrated Science	CSI, Catch a criminal!
8	Change of matter	Fast or slow
9	Bio engineering technology	Food additives, A to Z !
10	Control (Stimulus and response)	The power of 2.5 %! The world with brain!

3.3 Instruments

In this research, self-esteem test developed by Rosenberg was used to measure the educational effects [14]. Rosenberg made this test based on adolescent's self-esteem and self-acceptance, and it is the most prevalently used self-esteem test. It consists of 10 questions, each in scale of one to four, examining both positive and negative feelings about oneself [15] [16]. In this research, we

changed the scale to one to five, one meaning 'not so much' and five meaning 'very likely'. The inter-item consistency reliability coefficient (Cronbach α) was 0.871. According to studies, the reliability and validity of this self-esteem test is appropriate for test instrument [15].

In order to examine student's academic self-efficacy, the test made by Kim (2001) was used [17]. In this paper, academic self-efficacy refers to individuals' convictions that they can successfully perform given academic tasks at designated levels [18]. This test consists three parts: self-regulated efficacy, confidence, and preference of task difficulty. There are 10, 8, 10 questions for each part respectively, and five-point Likert scale was used. The Cronbach α for self-regulated efficacy, confidence, and preference of task difficulty is 0.90, 0.87, and 0.86 respective, and the overall reliability coefficient was 0.90 [19].

Self-regulated efficacy is an efficacy expectation on how well one can carry out self-regulated matters such as self-observation and self-response. Preference of task difficulty is one's preference of task difficulty in a performing situation where one can choose and set the goal. Person with high self-efficacy is those who believe they can perform well and choose challenging and difficult tasks as something to be mastered with specific decisions [20].

Confidence is degree of belief in one's own value or ability. Applying confidence in an academic situation, it can be defined as learner's belief in one's own academic performance ability.

4. RESULT

4.1 Students' Self-Esteem

The difference of student's self-esteem pre- and post- online programs was examined as shown in Table 3. Examining the mean differences of self-esteem based on learning methods, both classes showed statistically significant differences in self-esteem. Before the program started, class A (online-mentor only) showed slightly higher self-esteem than class B (online mentor and onsite mentor working together). When the program was finished, class B showed much greater self-esteem than before.

Examining the differences of self-esteem based on gender, both boys and girls showed statistically significant differences. Before the program, boys had slightly lower self-esteem, but after the program, they showed considerable increase.

Table 3. Students' self-esteem

	Groups	N	Pre-test M(SD)	Post-test M(SD)	<i>t</i>	<i>p</i>
Learning Method	Class A: Online mentor	20	2.85(.167)	3.24(.343)	-5.406	.000
	Class B: Online mentor + offline	48	2.83(.260)	3.38(.329)	-8.786	.000
Gender	Boys	37	2.79(.204)	3.34(.373)	-7.564	.000
	Girls	31	2.88(.373)	3.33(.293)	-6.724	.000

4.2 Students' Academic Self-Efficacy

The academic self-efficacy difference of participants was examined, and the result is in Table 4. Examining the mean difference of self-efficacy responding to learning methods, both classes showed improved mean scores after the program. Class A's self-regulated efficacy and preference to difficult tasks

showed statistically significant differences in the level of $p < 0.01$. Confidence shows statistically significant differences in the level of $p < 0.05$.

Class B shows statistically significant differences for confidence and preference to difficult tasks in the level of $p < 0.001$. Especially confidence greatly increased, even though it started very low.

Examining the mean differences of academic self-efficacy responding to gender, both boys and girls showed statistically significant differences. In the case of boys, confidence and preference of difficult tasks after the program showed statistically significant differences in the level of $p < 0.01$. Even though boys had high mean score of self-regulated efficacy but it does not have any statistically significant differences.

In the case of girls, all three subscales of academic self-efficacy, self-regulated efficacy, confidence, and preference of difficult tasks showed statistically significant differences in the level of $p < 0.001$.

Table 4. Students' academic self-efficacy

		Sub factor	Mean		<i>t</i>	<i>P</i>
			Pre	Post		
Learning method	Class A: Online mentor (N=20)	Self-regulated efficacy	2.66	3.07	-2.851	.010
		confidence	2.52	3.20	-2.259	.036
		Preference to difficult tasks	3.00	3.79	-9.141	.000
	Class B: Online mentor + onsite mentor (N=48)	Self-regulated efficacy	2.70	2.82	-1.089	.282
		confidence	2.32	3.41	-7.535	.000
		Preference to difficult tasks	3.05	3.71	-8.552	.000
Gender	Boys (N=37)	Self-regulated efficacy	2.71	2.88	-1.203	.237
		confidence	2.46	3.34	-4.283	.000
		Preference to difficult tasks	3.03	3.70	-6.959	.000
	Girls (N=31)	Self-regulated efficacy	2.66	2.91	-6.264	.000
		confidence	2.28	3.36	-6.264	.000
		Preference to difficult tasks	3.03	3.76	-11.018	.000

5. CONCLUSION

This research proves the academic effects of online education program for economically disadvantaged 6th grade students. The 10 online education program was proceeded in two classes for ten weeks: one with just the online-mentor and the other with both online and onsite mentors. The students received self-esteem scale

and academic self-efficacy test at the very first and last class of the program.

As a result, students showed positive alteration of self-esteem and academic self-efficacy after the program. The class with both online and onsite mentors showed higher self-esteem than the other class. Both boys and girls improved in self-esteem, but there was no difference between genders.

In the case of academic self-efficacy, all students showed increased mean score. The students with just the online-mentor showed statistically significant differences in self-regulated efficacy and preference of difficult tasks among academic self-efficacy subscales. The students with both online and onsite mentors, on the other hand, showed statistically significant differences in confidence and preference of difficult tasks among academic self-efficacy subscales, but not in self-regulated efficacy.

This result proves that online-education program for underprivileged students is effective in developing students' self-esteem and academic self-efficacy. Especially students with both online mentor and onsite mentor showed much increased self-esteem, so it is suggested to provide someone who take care underprivileged students where they live.

In order to raise underprivileged students with high potential into outstanding individuals, these students need to be identified in early stage as possible and get effective education program. In this sense, our online education program provides effective education to underprivileged students, and much more education programs should be provided to these students. Also more research needs to develop effective and suitable education programs for diverse kinds of underprivileged students.

6. REFERENCES

- [1] Perino, S. C. and Perino, J. 1981. *Parenting the gifted*. New York, NY.
- [2] Kim, H. 2009. A study on the influence of parental academic expectation to academic achievement of children: mediating effect of academic self-efficacy and test anxiety, *Korean Society for Creativity Education*, 9(2). 127-143.
- [3] Olszewski-Kubilius, P., and Clarenbach, J. 2012. *Unlocking emergent talent: Supporting high achievement of low-income, high-ability students*. Washington, DC: National Association for Gifted Children.
- [4] Kim, S., Park, E., and Park, K. 2009. *Cyber education for the underprivileged gifted students in science*. Korea Foundation for the Advancement of Science and Creativity Report 2009-53.
- [5] Freeman, J. 2000. In *International Handbook of Research and Development of Giftedness and Talent*. Oxford: Pergamon Press.
- [6] Mayer, S.E. 1997. *What Money can't Buy: Family Income and Children's Life Chances*. Cambridge, MA: Harvard University Press.
- [7] Masten, A. S. 2001. Ordinary magic: Resilience processes in development. *American Psychologist*, 56, 227-238.
- [8] Hwang, C., Lee, H., and Kim, H. 1999. *Adolescents problems and suggestion of low income family*. Korea Institute for Youth Development Report.
- [9] Akin, T., Cowan, D., Dunne, G., Palomares, S., Schilling, D., and Schuster, S. 1990. *The best self-esteem activities: For the elementary grades*. ERIC document reproduction service.
- [10] Baumeister, R. F., Heatherton, T. F., and Tice, D. M. 1994. *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.
- [11] Erol, R. Y., and Orth, U. 2014. Development of self-esteem and relationship satisfaction in couples: Two longitudinal studies. *Developmental Psychology*, 50, 2291-2303.
- [12] Bandura, A., and Schunk, D. H. 1981. Cultivating competence, self-efficacy and intrinsic interest through proximal self-motivation. *Journal of Personality and social Psychology*, 41 (3), 586-598.
- [13] Schunk, D. H. 1983. Ability versus effort attributional feedback: Differential effects on self-efficacy and achievement. *Journal of Educational Psychology*, 75 (6), 848-856.
- [14] Rosenberg, M. 1965. *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- [15] Blascovich, J. and Tomaka, J. 1991. Measures of self-esteem. *Measures of Personality and Social Psychological Attitudes*, 1, 115-160.
- [16] Robins, R. W., Trzesniewski, K. H., Tracy, J. L., Gosling, S. D., and Potter, J. 2002. Global self-esteem across the life span. *Psychology and Aging*, 17, 423-434.
- [17] Kim, A. Y., and Park, I. Y. 2001. Construction and Validation of Academic Self-Efficacy Scale. *Korean Journal of educational research*, 39, 1, 95-123.
- [18] Schunk, D. H. 1991. Self-efficacy and academic motivation. *Educational Psychology* 26, 207-231.
- [19] Hong, H. 2012. *A study on the influence of parental academic expectation to academic achievement of children: mediating effect of academic self-efficacy and test anxiety*. Master thesis, Dong Duk Women's College.
- [20] Schunk, D. H. 1990. Goal setting and self-efficacy during self-regulated learning. *Educational Psychologist*, 25, 71-86.