

Self-assessment of teachers' knowledge regarding their preparation for caring for a child with type 1 diabetes at school

Samooocena wiedzy nauczycieli w zakresie przygotowania do sprawowania opieki nad dzieckiem z cukrzycą typu 1 w szkole

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;

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Abstract

Background. Diabetes incidence in Poland is considered to be one of the highest in Europe. Children of school age spend most of their time at home and at school. Teachers who are prepared to take care of children to the extent acceptable under Polish law may be a guarantee of the sense of safety of both ill children and their parents.

Objectives. To investigate the teachers' self-assessment regarding the level of preparation for taking care of a child with type 1 diabetes at school.

Material and methods. The study was conducted in the period from November 2017 to February 2018 with the use of a diagnostic survey method, a survey technique and the authors' own questionnaire. Two hundred seventy-two teachers from 23 educational institutions located in the Opole voivodeship (province) were studied.

Results. More than half of respondents (57.93%; $n = 157$) believe that the level of teachers' preparation to care for a child with diabetes is low. This assessment did not depend on the school location ($p = 0.169$), seniority in the teaching office ($p = 0.124$) or the type of educational institution in which the teacher was employed ($p = 0.979$). A group of 34.20% ($n = 93$) of respondents reported that the teacher could examine the level of blood glucose in the child with diabetes without receiving the parent's consent. The majority (97.79%, $n = 266$) stated that teachers working at school with a sick child should receive training on the principles of caring for a child with diabetes.

Conclusions. It is necessary to implement an educational program aimed at preparing teachers for taking care of students with diabetes during their stay at school.

Key words: diabetes mellitus type 1, child, teachers, school

Streszczenie

Wprowadzenie. Współczynnik zapadalności na cukrzycę w Polsce jest uważany za jeden z najwyższych w Europie. Środowiskiem, w którym dziecko w wieku szkolnym spędza najwięcej czasu jest dom oraz szkoła. Gwarancją poczucia bezpieczeństwa, zarówno chorych dzieci, jak i ich rodziców, mogą być nauczyciele przygotowani do sprawowania opieki nad dzieckiem w zakresie akceptowalnym przez polskie prawo.

Cel pracy. Poznanie samooceny nauczycieli w zakresie stopnia ich przygotowania do sprawowania opieki nad dzieckiem chorującym na cukrzycę typu 1 w szkole.

Materiał i metody. Badania były prowadzone w okresie od listopada 2017 do lutego 2018 r. metodą sondażu diagnostycznego, techniką ankietowania z wykorzystaniem autorskiego kwestionariusza ankiety. Zbadano 272 nauczycieli z 23 placówek oświatowych zlokalizowanych na terenie województwa opolskiego.

Wyniki. Zdaniem ponad połowy respondentów (57,93%; $n = 157$) poziom przygotowania nauczycieli do sprawowania opieki nad dzieckiem chorym na cukrzycę jest niski. Ocena ta nie była zależna od lokalizacji szkoły ($p = 0,169$), stażu pracy w zawodzie nauczyciela ($p = 0,124$) ani od rodzaju placówki oświatowej, w której zatrudniony był nauczyciel ($p = 0,979$). Grupa 34,20% ($n = 93$) ankietowanych podała, iż nauczyciel może, bez porozumienia z rodzicem, zbadać dziecku choremu na cukrzycę stężenie glukozy we krwi. Większość (97,79%; $n = 266$) stwierdziła, iż nauczyciele pracujący w szkole, do której uczęszcza chore dziecko powinni odbyć szkolenie na temat zasad opieki nad dzieckiem zmagającym się z cukrzycą.

Wnioski. Konieczna jest realizacja na skalę masową programu edukacyjnego mającego na celu przygotowanie nauczycieli do objęcia opieką uczniów chorujących na cukrzycę w czasie ich pobytu w szkole.

Słowa kluczowe: cukrzyca typu 1, dziecko, nauczyciele, szkoła

Introduction

Type 1 diabetes is an autoimmune disease caused by genetic, environmental and immunological factors. Its essence lies in an absolute insulin deficiency, which results from a destruction of the pancreas β cells. It is currently the most common chronic metabolic disease in children.^{1,2}

International Diabetes Federation (IDF) reported in 2017 that there are 1,106,500 children aged 0–19 years affected by the type 1 diabetes in the world and every year 132,600 are diagnosed with it.³ Average global incidence of type 1 diabetes in children increases by 3–4% every year.⁴ According to IDF, the number of 0–19-year-olds with type 1 diabetes in Poland in 2017 was estimated at 14,544. An average of 18.4 new cases of the disease are diagnosed every year per 100,000 children within this age range.³ Results of the research conducted in Poland (over the last 20 years) under the Epidemiology and Prevention of Diabetes Study (EURODIAB) project indicate a 300% increase in the number of cases, with the highest growth recorded in children aged 0–4 years and 5–9 years. It is predicted that by 2025 the incidence of diabetes in Poland will have increased 4-fold and will concern children aged 0–9 years in particular.^{5,6} The above epidemiological data suggest that within the next several years children with type 1 diabetes will be taught in every preschool/ kindergarten and school. When this situation is observed, admission of a child with diabetes will cease to be a real and sufficient reason for teachers' concerns, a sitch that is currently experienced by some children and their parents.⁷

Diabetes is a chronic disease with a risk of complications, including acute ones – threatening the child's life, such as hypoglycemia or ketone coma, and the ones that

may affect the child's quality of life in the future (micro- and macroangiopathies).⁷ Diabetes does not disturb mental development of a child (unless the complications have resulted in damage to the central nervous system), but like any other chronic disease, it affects his or her functioning on many levels, including the cognitive, emotional and social one.⁸ When children are overburdened with treatment and difficulties associated with daily control, their emotional development is impacted. On the other hand, diabetes that is not treated may result in a child's improper cognitive functioning, caused by decreased memory capacity, attention selectivity and analysis of complex information. Limitations imposed on a child by a disease, including the restrictive or directive style of upbringing and a limited access to activities undertaken by healthy peers, constitute factors that imply difficulties in the social functioning of the child.⁸ Considering the aforementioned complications regarding the functioning of a child with diabetes, it is necessary to provide such a child with specialist care at school, provided by both teachers, the school counselor and the school psychologist. It is also significant to encourage cooperation between the teaching staff and parents, as this active cooperation of all members of the therapeutic team, especially the attending physician and a diabetes nurse along with the family, teachers, class teachers, and other people taking care of the child on a daily basis, as well as with their peers, is a basic condition for a treatment to be effective.^{8,9}

Teachers may play a key role in monitoring their diabetes-affected students as school-age children spend a significant part of their time at school.¹⁰ School staff, teachers in particular, should be aware of the problems associated with caring for a child with type 1 diabetes in order to create for them an environment that promotes safety and optimization of the disease management in

school. Children with diabetes should be provided with such care in the facility they attend to be able to participate fully in all school activities, i.e., have suitable conditions to determine glycemia levels, administer insulin and take food according to the particular moment demand.¹¹ The teacher should never assume that the child is fully aware of the disease and is able to cope with it to the full extent.¹²

The reason why teachers are frequently concerned with diabetes-affected children results from their lack of knowledge and fear of responsibility. Such a conclusion may be drawn from the research conducted in Lesser Poland schools in 2013, which clearly shows that the main reasons related to difficulties in caring for such children at school indicated by the surveyed principals of schools included both the lack of information on how to deal with a child struggling with diabetes and the lack of legal regulations.¹³ Therefore, teachers should be properly prepared in terms of providing care for children struggling with this disease. If this occupational group was trained to obtain adequate knowledge on how diabetes should be properly managed, the misconceptions regarding the functioning of children with diabetes at school and fear of chronic diseases in general would be greatly reduced. Additionally, if children with diabetes were properly supervised, the school attendance rate might increase and consequently the success rate of these children, e.g., in the form of better grades, would be raised.¹⁰

Therefore, it is justified to examine the preparation level of teachers in terms of taking care of a child with type 1 diabetes at school. The paper assumes that the level of teachers' preparation in terms of supervising such children at school is low and that seniority as a teacher, the type of educational institution as well as the institution's location (countryside/city) do not determine the level of teachers' knowledge on how to manage children with type 1 diabetes at school.

The aim of the study was to gain insight into the self-assessment of teachers in terms of how well they thought they were prepared to supervise a child with type 1 diabetes at school and to determine whether the variables, including seniority as a teacher, type of educational institution and location of the institution, significantly determine the level of knowledge of the respondents regarding taking care of such a child.

Material and methods

Two hundred seventy-two teachers from 23 educational institutions located in the Opole voivodeship were studied. The vast majority of respondents – 86.03% ($n = 234$) – were female, while men constituted 12.87% ($n = 38$) of the surveyed group. The median age of teachers was 45 years ($min-max = 23-65$ years), and the median seniority of the office was 20 years ($min-max = 1-38$ years).

First-degree studies were completed by 2.94% ($n = 8$) of respondents, whilst second-degree degree studies by 95.95% ($n = 261$). The majority of teachers were employees of primary schools (56.99%; $n = 155$) located mainly in poviat (county) (40.81%; $n = 111$) and voivodeship (province) (30.15%; $n = 82$) capitals – see Table 1.

The study was conducted in the period from November 2017 to February 2018. Participation in the survey was voluntary and anonymous, and the study was conducted with the consent of the institutions' principals. Before the study, each participant had been informed about the purpose and methodology of the study and about the possibility to withdraw from each phase of the study without giving any reason. The method of a diagnostic survey was used; the survey was the research technique and the questionnaire, designed for the research requirements, was the tool. The questionnaire included an imprint and detailed questions that allowed to learn what opinions teacher held on the level of their preparation regarding caring for a child with type 1 diabetes at school. Respondents completed the questionnaire before commencing workshops conducted as part of the *Uczeń z cukrzycą w szkole* (Student with Diabetes at School) program, in the presence of the instructor, without the possibility to ask questions concerning the answers. Completing the questionnaire was tantamount to consenting to participate in the research. A discussion on the questionnaire questions and correct answers took place during the workshops.

Statistical analysis was performed using the STATISTICA v. 12 (StatSoft, Inc., Tulsa, USA) software and Microsoft Excel 2013 (Microsoft Corp., Redmond, USA). Descriptive statistics were calculated for measurable variables, while counts and percentages were calculated for qualitative variables. The latter were tested using the Shapiro–Wilk test to determine the distribution type. The χ^2 test was used to verify hypotheses, and if the assumptions were not met, exact Fisher's F test was used to verify them. Results for which $p \leq 0.05$ were considered statistically significant.

Results

According to more than half of respondents – 57.93% ($n = 157$) – the level of teachers' preparation to care for a child with diabetes is low, and 39.11% ($n = 106$) regard it as adequate. Only 2.95% ($n = 8$) of respondents mentioned a high level of teachers' preparation to take care of a child suffering from diabetes. This self-assessment was not statistically significant in relation to the location of the school ($p = 0.169$), seniority as a teacher ($p = 0.124$) or type of educational institution employing the teacher ($p = 0.979$) – see Tables 2–4.

The low level of the respondents' preparation to care for a child with diabetes seems to be confirmed by the re-

Table 1. Zmienne socjodemograficzne badanych

Tabela 1. Zmienne socjodemograficzne badanych

Variables		<i>n</i>	%
Gender	women	234	86.03
	men	35	12.87
	no data	3	1.10
	total	272	100
Age [years]	<i>M</i>	43.97	
	<i>SD</i>	9.24	
	<i>Q</i> ₁ – <i>Q</i> ₂ – <i>Q</i> ₃	37.00–45.00–52.00	
	<i>min</i> – <i>max</i>	23.00–65.00	
Job seniority [years]	<i>M</i>	20.00	
	<i>SD</i>	9.89	
	<i>Q</i> ₁ – <i>Q</i> ₂ – <i>Q</i> ₃	12.00–20.00–28.00	
	<i>min</i> – <i>max</i>	1.00–38.00	
Education level	bachelor's degree	8	2.94
	master's degree	261	95.96
	no data	3	1.10
	total	272	100.00
Type of educational institution	preschool/ kindergarten	18	6.62
	elementary school	155	56.99
	junior high school	14	5.15
	high school	18	6.62
	preschool/ kindergarten and elementary school	4	1.47
	elementary school and junior high school	35	12.87
	junior high school and high school	9	3.31
	elementary school and high school	5	1.84
	all types of schools listed	11	4.04
	no data	3	1.10
	total	272	100
Place of work	countryside	72	26.47
	poviat capital	111	40.81
	voivodeship capital	82	30.15
	no data	7	2.57
	total	272	100.00

n – number of the analyzed characteristic in the sample; no data – no data available; *M* – mean; *SD* – standard deviation; *Q*₁ – lower quartile (25th percentile); *Q*₂ – middle quartile (median); *Q*₃ – upper quartile (75th percentile).

spondents' answers to substantive questions included in the questionnaire. In fact, 34.20% (*n* = 93) of respondents stated that the teacher could examine the blood glucose level in a child with diabetes without consulting the parent, 44.90% (*n* = 122) indicated that they could not do it and 21% (*n* = 57) had no opinion on the matter. A group of 43% (*n* = 117) decided that a teacher could give a child glucagon in hypoglycemia without consulting the parent, 32.70% (*n* = 89) stated the opposite and 24.30% (*n* = 66) had no opinion. Teachers working in voivodeship capitals gave correct answers significantly more often than those working in poviat capitals and rural areas. Teachers employed in rural areas most often did not have opinions on the abovementioned subject, and teachers working in poviat capitals mainly provided incorrect answers ($\chi^2 = 18.701$; *p* = 0.001). Length of service as a teacher had no significant impact on the type of answers provided ($\chi^2 = 4.292$; *p* = 0.637). Moreover, 18.40% (*n* = 50) of respondents supported the statement that a teacher may administer insulin to a child suffering from diabetes without consulting the parents; 58.80% (*n* = 160) answered "no" to the question, while 22.80% (*n* = 62) did not take an unequivocal stance.

All 100% (*n* = 272) of respondents agreed that parents should inform the principal of the institution and the child's class teacher about the child's illness. Moreover, a vast majority of respondents – 97.79% (*n* = 266) – stated that teachers working in a school attended by a sick child should receive training on the principles of care for a child struggling with diabetes. In this case, the location of the school (*p* = 0.247), the type of educational institution in which the teacher was employed (*p* = 0.636) and the job seniority as a teacher (*p* = 0.223) also did not diversify the respondents' answers.

According to the respondents, it would be optimal for such training to be carried out by a doctor from a diabetes clinic alongside a nurse employed in such a clinic or in school healthcare (30.1%; *n* = 82), only a doctor employed in a diabetes clinic (28.3%; *n* = 77), only a diabetes nurse (19.9%; *n* = 54), a diabetes nurse alongside a school nurse (4.00%, *n* = 11), or only a school nurse (3.3%, *n* = 9). There were also responses suggesting that such training should be conducted by a diabetes clinic doctor and a parent of a child with diabetes (3.3%; *n* = 9), a nurse and a parent of a child with diabetes (1.1%; *n* = 3) or the parent alone (1.1%; *n* = 3). A group of 23 teachers (8.5%) advocated that all the abovementioned people should be involved in such training. Only 1 person (0.4%) was of the opinion that it was not necessary at all. Teachers of schools located in voivodeship capitals believed that training sessions should be conducted by a doctor from a diabetes clinic, teachers working in schools located in poviat capitals more often pointed to a team of a nurse and a doctor, and those employed in rural areas chose a nurse from diabetes clinic or school healthcare ($\chi^2 = 14.140$; *p* = 0.028). Furthermore, 82.7% (*n* = 225) of the teachers

Table 2. Self-assessment of teachers in terms of their preparation for taking care of a child with diabetes at school vs school location**Tabela 2.** Samoocena nauczycieli w zakresie przygotowania do sprawowania opieki nad dzieckiem chorym na cukrzycę w szkole vs lokalizacja szkoły

Survey question and answer		School location ^a			Result of Fisher's exact <i>F</i> test
		countryside	poviat capital	voivodeship capital	
How would you rate the level of preparation of teachers to take care of a child with diabetes?	high	<i>n</i>	3	3	<i>p</i> = 0.169
		%	4.20	2.70	
	adequate	<i>n</i>	36	41	
		%	50.00	36.90	
	low	<i>n</i>	33	67	
		%	45.80	60.40	

p – level of statistical significance.^a The number of responses does not amount to 272 due to non-responses.**Table 3.** Self-assessment of teachers in terms of their preparation for taking care of a child with diabetes at school vs seniority as a teacher**Tabela 3.** Samoocena nauczycieli w zakresie przygotowania do sprawowania opieki nad dzieckiem chorym na cukrzycę w szkole vs staż pracy nauczycieli

Survey question and answer		Seniority as a teacher ^a				Result of Fisher's exact <i>F</i> test
		≤7 years	8–17 years	18–28 years	>28 years	
How would you rate the level of preparation of teachers to take care of a child with diabetes?	high	<i>n</i>	2	3	2	<i>p</i> = 0.124
		%	5.30	4.20	2.40	
	adequate	<i>n</i>	11	34	37	
		%	28.90	47.20	44.60	
	low	<i>n</i>	25	35	44	
		%	65.80	48.60	53.00	

^a The number of responses does not amount to 272 due to non-responses.**Table 4.** Self-assessment of teachers in terms of preparation for taking care of a child with diabetes at school vs type of educational institution in which the teacher is employed**Tabela 4.** Samoocena nauczycieli w zakresie przygotowania do sprawowania opieki nad dzieckiem chorym na cukrzycę w szkole vs rodzaj placówki oświatowej, w której zatrudniony jest nauczyciel

Survey question and answer		Teacher's place of employment (type of educational institution) ^a							Result of Fisher's exact <i>F</i> test
		preschool/ kindergarten	elementary school	junior high school	high school	elementary school and junior high school	junior high school and high school	all types of schools listed	
How would you rate the level of preparation of teachers to take care of a child with diabetes?	high	<i>n</i>	0	5	0	0	2	0	<i>p</i> = 0.124
		%	0.00	3.20	0.00	0.00	5.70	0.00	
	adequate	<i>n</i>	6	64	6	7	13	4	
		%	33.30	41.30	42.90	38.90	37.10	44.40	
	low	<i>n</i>	12	86	8	11	20	5	
		%	66.70	55.50	57.10	61.10	57.10	55.60	

^a The number of responses does not amount to 272 due to non-responses.

participating in the survey stated that students in a class including a sick child should be educated on the symptoms, control and treatment of diabetes as well as administering aid. Some respondents (15.4%; *n* = 42) supported the idea that in the case of a child with diabetes, it is worth considering individual teaching, which may confirm the extent to which taking care of a child with diabetes at school constitutes a serious problem for teachers.

Discussion

A teacher's job is to provide all children, including diabetics, with a sense of security, and to create conditions for full assimilation into the classroom. In order for teachers to be able to perform this task, they should be familiar with the causes, symptoms and complications associated with diabetes, as well as therapeutic ways of

dealing with the child. Teachers need to be able to recognize the symptoms of impending hypoglycemia, know the factors that may lead to it and be able to administer first aid to the child.¹² However, according to Fichna et al., these expectations connected to diabetes may seem very difficult for teachers, even to the point where they exceed their competences and scope of responsibilities.¹⁴ In a study by Boden et al., primary school staff also expressed numerous concerns about blood glucose testing, performing injections in children with diabetes, children's self-care abilities, and parents' reactions to health-related decisions made at school.¹⁵

The results of our own research confirmed the hypothesis that the majority of teachers (57.93%; $n = 157$) were poorly prepared to take care of a child suffering from diabetes, regardless of the teacher's job seniority, type of institution in which they were employed or its location. Similar results were obtained by Aycan et al. based on a survey of 1,054 teachers in Turkey; 47.6% had a medium level of knowledge and 32.4% a low level of knowledge. In the study conducted by the authors of this paper, 94% of respondents provided the correct definition of diabetes, but 10.1% of the teachers were not willing to teach children with diabetes. A group of 24.3% believed that sick children should not be allowed to attend physical education classes, thus failing to notice the beneficial effects of exercise on blood glucose regulation.¹⁰ Research conducted in 2013 among 2,239 headmasters of schools in Lesser Poland showed that 39.8% of respondents ($n = 891$) confirmed that a child with diabetes was attending "their" school. Meanwhile, in 40% of schools, staff did not have the ability to measure blood sugar levels, react to symptoms of severe hypoglycemia or recognize symptoms of hypoglycemia. In 57.5% of schools, none of the employees had been trained in dealing with a child suffering from diabetes, although a group of 59.3% of respondents indicated that they would be interested in such training.¹³ The results of our own study seem to correspond partly with the ones above; however, a much larger group (97.79%; $n = 266$) stated that teachers working in a school attended by a sick child should receive training on the principles of care for a child with diabetes.

In our own research, some respondents stated that the teacher could check blood glucose levels in a child with diabetes and administer insulin or glucagon in case of hypoglycemia. According to clinical recommendations of the Polish Diabetes Society, family members, caretakers and teachers of children and adolescents with diabetes should be familiar with the method of administering glucagon.¹⁶ The current legal system lacks clear regulations concerning the teacher's duties towards a child with diabetes at school. In the aforementioned survey conducted in schools in the Lesser Poland voivodeship, legislative deficiencies in this respect and a lack of information on how to deal with a child suffering from diabetes were identified by teachers as the main reasons for difficulties in taking

care of children with this condition at school.¹³ On the one hand, in situations of an urgent health emergency, it is such people as the teacher or the principal of the institution who are obliged to provide premedical assistance to the best of their ability.¹⁷ Moreover, a teacher, just like any other citizen, is obliged to provide first aid pursuant to the provisions of Article 162 of the *Act of June 6, 1997 – The Penal Code*.¹⁸ On the other hand, with the current healthcare system and the existing legal status of an educational system unit, including preschools/kindergartens and schools, these persons do not have the appropriate competences to perform tasks in the field of healthcare for children and youth. In response to the 2012 interpellation concerning students with diabetes, the Secretary of State at the Ministry of National Education (Polish: Ministerstwo Edukacji Narodowej – MEN), referring to matters concerning administering medication to children in an institution of education and premedical activities performed on students by teachers, informed that such activities may be conducted on the basis of a voluntary, expressed in writing, commitment of the teacher towards the parents or legal guardians of the child.¹⁷ In accordance with the official position presented by the Ministry of National Education in 2014 concerning the provision of care to chronically ill children at school (educational institution), specialist procedures (i.e., administering insulin or ongoing control of blood sugar concentration using a glucose meter) may also be performed by a person other than a nurse, including a teacher, provided that the teacher has undergone specialist training in this field. In this document, the Ministry of National Education indicates that holding medical education is not a prerequisite.¹⁹

In April 2018, at the request of the Minister of Health, a draft law on healthcare for students was drawn up (it is currently being consulted). In accordance with Article 22 of this project, it is an educational setting nurse or a school nurse who will carry out tasks consisting in such things as recognizing and taking action in emergency situations resulting from chronic disease or disability, administering medication or supervising their proper use, performing or controlling independent performance of the necessary activities undertaken during a chronically ill student's stay at school.²⁰ This raises the question of who should help a diabetic child measure glycemia or administer insulin if there is no nurse in the educational institution to do this. Driscoll et al., similarly to the authors of this paper, believe that training of non-medical staff (in this case: teachers) could increase the safety of children with diabetes if a nurse is not available at school.²¹

Chronically ill children generally encounter kindness on the part of their teachers and peers. Any forms of contempt or even discrimination seems to be prevented by the transfer of knowledge about the chronic disease between parents, students and teachers. According to the Constitution of the Republic of Poland, information about a disease should not be made public, but for the good and

safety of the child, parents should report this fact to the teacher/class teacher. The results presented in the paper seem to be in line with the above assumptions, as all the teachers surveyed (100%; $n = 272$) agreed that parents should provide information about the child's disease to the principal of the institution and the child's class teacher. According to Fichna et al., older students should be encouraged to tell their peers about their health problems themselves.¹⁴ Research conducted by Nowak et al. shows that over 50% of surveyed students declare that they provide their peers with information on their disease, and it can be read in other studies that 85% of junior high school students informed their colleagues about their disease.²²

Regulating the legal situation of a child with diabetes at school and obliging teachers to be trained in the rules of care for a chronically ill child at school can be considered as a first step towards ensuring the safety of children, their parents and teachers.²³

Conclusions

The level of teachers' preparation to take care of a child with diabetes is low, and a teacher's length of service, the location of the school (countryside, city) and the type of educational institution in which the teacher is employed do not determine the level of appropriate knowledge. In view of the above, it seems justified to implement a mass-scale educational program aimed at preparing teachers to take care of students suffering from diabetes during their stay at school.

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