

Exploring Omani Teachers' Needs For Utilizing E-Learning Generator To Develop Learning Objects For Their Students

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Abstract

Learning objects are designed and developed to enhance the educational content. They can be used to promote the teaching and learning processes and achieve intended learning outcomes. Teachers, as subject matter experts, are considered the best experts to design and develop such learning objects. Thus, developing an easy-to-use mechanism to design and produce learning objects by teachers in a manner that does not conflict with their capabilities, knowledge, and limited skills in this field, will help teachers achieve that goal. The current study sought to investigate the perceptions of Omani teachers to the need for using an e-learning generator to produce learning objects for their students without the need to possess high technical skills. Based on the literature, a survey of 120 teachers from various schools in Muscat was conducted to determine their perceptions to four aspects: (1) the need for using learning objects in teaching and learning, (2) teachers' knowledge of designing and producing learning objects, (3) teachers' skills of designing and producing learning objects, and (4) the need for designing a platform to help teachers easily produce learning objects. According to the findings, most teachers (76.08%) believe that learning objects are needed in teaching and learning. However, they reported very low knowledge and skills about designing and producing learning objects. Finally, most teachers (79.59%) expressed their need to have a platform to help them design and produce e-learning objects. Based on the findings, the study proposed to develop an eLearning generator to be used in Omani schools.

Keywords: Learning Objects, e-Learning Generator, Development of learning Objects, Omani Teachers.

1. Introduction

In light of the rapid development occurring in the field of e-learning, and with the continuous growth of patterns of e-content delivery, the concept of Learning Objects has emerged. They can be described as integrated learning resources or components, where large educational contents are divided into small components that address one educational goal. They are published on the internet and organized with specific keywords that facilitate the ability of learners to search and obtain them, as they can be reused in new educational situations and in different contexts.

The concept of learning objects has started to increase significantly and influencing the learning community, and despite this, there is still no agreement on a clear and unified definition, but most of the literature have indicated that a learning object is any digital entity with an added educational value to support the learning process (Ahn et al., 2017). This definition is considering learning objects not just an entity that includes information, but an entity that provides a specific educational value. They may include multimedia, simulations, video clips, audio clips, static graphics, animation, ...etc. There is an interaction between the learner and the content of the learning object that allows for meaningful communication in which the learner reflects his knowledge, experience, and previous experiences (Almeida et al., 2018). Deogratias agree with Almeida and added that learning objects provide a new concept for the learning process. They are small educational components that can be used in various learning contexts. (Deogratias, 2022)

The development of e-content using learning objects has become a major requirement for the design of e-content. Literature indicates that developing content using learning objects leads to the production of high-quality learning resources that contribute effectively to the educational situations, as they consider individual differences between learners and their educational needs. Research results confirm that the use of learning objects increases the effectiveness of learning and improves its' qualitative output, as well as reduces the cost and time required to produce high-quality standardized learning resources.

The development of e-content has become dependent on building standard learning objects and assembling them in digital platforms. Such platforms are an interactive learning environment that employs web technology and combines the advantages of e-content management systems with social networks, and enables teachers to publish lessons, assign tasks and implement educational activities, and communicate with learners through multiple technologies, and it helps to exchange ideas and opinions between teachers and students, and the sharing of educational content, which helps to achieve high-quality educational outcomes.

Learning objects are considered the basic unit of building the content of e-courses in later stages, as needed, and institutionally planned. They are the digital image of educational content, which varies in size and complexity from text to graphics and pictures, to multiple media. So, it is possible to classify learning objects into the following patterns: text learning objects, pictures learning objects, sounds learning objects, animations and video clips, and hybrid Learning Objects.

Through the work of the researcher in the educational field, specifically in the field of educational technology and e-learning, and through his experiences in this field inside and outside the Sultanate of Oman, the researcher noted the strong desire of a large proportion of teachers to possess and use quality

electronic educational content reflecting the curriculum with highly added value. Such content can be used with their students to improve their performance and enhance their learning. But that desire always collides with the skill and technical level of those teachers, and as a result they turn away from achieving that desire and rely on ready-made electronic content that may not be compatible with what they want to achieve with their students. In the same context, the researcher noticed the great need of the majority of students in different stages of education for electronic educational content designed and produced specifically for them by their teachers or at the very least by another teacher who took into account their characteristics and educational needs. That is what exactly they miss when they learn from electronic educational content available on Internet that does not adequately meet their needs and learning requirements. Especially if they are low-achieving students who need a different style of educational content delivery.

In light of the researcher's previous observation, he found that there is an urgent need to provide an easy-to-use mechanism for teachers to help them design and produce electronic educational content that suits the needs and characteristics of their students and others who have the same needs and characteristics. Also, there is a need for this e-learning content to be available to students in an easy-to-access way, and that it responds to their actual and targeted needs of the learning outcomes.

To be sure of the presence of the problem, the researcher held some interviews with many teachers, educational supervisors, and e-content developers in the Ministry of Education in the Sultanate of Oman. These interviews at reaching a general impression on the efforts of the Ministry. The researcher concluded that there is no strategy for developing content in the ministry on a wider scale, and the matter is related to some ideas and initiatives that were not sustainable because there is no clear strategy to encourage teachers to develop electronic content, and there are no short, medium or long-term training plans to qualify teachers in the field of designing and producing electronic content, there are only some workshops whose impact on the ground has not been measured after completion, and therefore there is no data or evidence about the value of these workshops. It should be noted here that there are few individual initiatives from some teachers from time to time.

By referring to what is already available governmental or private initiatives, we find that the educational portal in the Omani Ministry of Education is the main electronic interface of the Ministry on the Internet, but by browsing it you will find that it is a service portal more than an educational portal, and this is the reality and the prevailing impression among all the Ministry's employees. The idea of e-government is closest to the scope of educational transactions. On the side of private initiatives, we find the (IDLAL) platform initiative supported by the Telecommunications Corporation (Oman Tel), which is an emerging platform based on the efforts of a group of promising Omani youth, but it lacks many standards for digital educational platforms, as the nature of educational / training content is inconsistent with many. Among the standards of educational and technical design, the lecturers on the platform are amateurs and not specialists in the fields of education or training, and by meeting the administrative official in the IDLAL platform, he indicated that the platform is an initiative that needs more planning, preparation, material and logistical support so that it can compete in this field at the Arab level.

The actual problem is that teachers require technical and pedagogical knowledge and skills to be able to design and produce high quality learning objects. Therefore, the current study seeks to explore Omani teachers' needs for using e-learning generator to produce learning objects for their students.

To accomplish this goal, the following four research questions were developed:

1. What are teachers' perceptions about the need for using learning objects in teaching and learning?
2. What are teachers' views about their knowledge of designing and producing learning objects to be used in their teaching?
3. What are teachers' perceptions about their skills of designing and producing learning objects to be used in their teaching?
4. What are teachers' perceptions about the need for designing a platform for helping them easily produce learning objects?

2. Literature Review

2.1. Learning objects concept and advantages

Learning objects are considered a significant leap in the production of electronic educational content that can be used in many educational situations. They represent a modern thought that has emerged in the field of teaching and learning technologies. They are based on the idea of "reuse" to keep pace with global trends to recycle use (Alvarado et al., 2018). Wiley (2008) defines them as independent digital units consisting of integrated and meaningful educational assets, and they are available in the form of images, drawings, texts, sounds and videos. They include some learning elements like content, objectives, and activities. They are authored, stored, indexed, evaluated, and distributed across the web. They are used as required by the learning situation and are reused whenever the situation requires it. Koh (2017) pointed out that they are an organized group of educational materials, developed based on educational standards.

The use of e-learning objects has many advantages, the most important of which is their ability to be reused, which saves lots of time and effort. Goranova (2019) indicated that they are not consumable, as they are constantly reused and, may be, in different specializations. For example, designing an educational object about rain with sound and movement (Animation) that can be used in several lessons such as a lesson about the winter season, a lesson on the formation of rain, a lesson on measuring rain, a lesson on electrical discharge and so on. This is considered a distinctive feature for learning objects. Also, among the advantages indicated by Goranova (2019) is flexibility in terms of presenting content in different ways that suit learners' styles, interests, abilities, individual differences, and other characteristics of learners. Moreover, Sychov and Chirtsov (2018) indicated that the ease of accessing e-learning objects through indexing, storing and retrieval is one of its important advantages.

Furthermore, several studies (Tseng et al., 2022; Li et al., 2016; Guimaraes, 2018; Valenzuela et al., 2017) have indicated that learning objects can contribute to increase learners' understanding and interaction with the learning content. They can develop learners' innovative thinking, enabling them to

progress in learning units according to their abilities, and providing them with learning experiences closer to real experiences.

Day and Erturk (2017) also provided many improvements and advantages learning objects can bring to the learning process such as: (1) accessible anytime and anywhere, (2) increase the interaction between the learners and the content, (3) increase learners' achievement rate due to the short time spent in learning, (4) increase learners' motivation to achieve learning objectives. (5) complete entity, as they provide learners with all the elements of learning, including content, self-evaluation, activities...etc. Moreover, MacDonald (2015) assured that the learner plays the role of an explorer while learning through learning objects, and this is an acceptable and highly required shift in the learners' roles. This is fully consistent with the philosophy of constructive learning in terms of encouraging the learner to participate and interact with the learning environment to build knowledge individually (Day & Erturk, 2017; MacDonald et al., 2005). This is consistent with what Kay and Knaack (2005) mentioned, as they asserted that learning objects are one of the web-based interactive tools, which support the learning of specific concepts by enhancing and directing the cognitive processes of learners, and this is usually done through using multimedia included in learning objects, which helps making abstract concepts more realistic for learners, while giving the learner more control over the learning environment provided by learning objects.

In the same context, Stöhr (2019) emphasized that learning objects support learning outcomes in various forms, such as understanding educational content or developing specific skills. Similarly, Oliveira and Silva (2019) agreed with the above and assured that learning objects, if designed according to the needs of the learners accurately, and with the aim of achieving specific learning outcomes, the likelihood of raising learners' motivation become very high.

On the institutional level, learning objects contribute to the low cost of multimedia production and provide various alternatives to the users of these objects. They are also characterized by the possibility of being updated and re-used without the need for re-design, which reduces the costs of producing them.

On the teachers' level, learning objects can be used to help them with working on achieving educational objectives for learners. Also, they are easy to use, and can be accessed quickly. However, designing and producing good quality learning objects need trained and experienced teachers. That is why Guimaraes (2018) emphasized the importance of creating teaching courses for designing learning objects and establishing centers to train teachers on the production of learning objects.

The researcher believes that there must be a way to encourage and help teachers to design and produce learning objects regardless of their production skills, where they rely only on their knowledge, motivation and need for those objects, and this will be the primary motivator for widespread adoption of learning objects and the enhancement of the educational process.

In addition, the researcher emphasized that using learning objects in schools allows teachers to adapt teaching materials and quietly measure learning progress. Hybrid activities can be used in increasing retention and engagement. For example, students in certain class may view a part of an interactive film about fractions before doing a hands-on exercise to apply what they've learned. Reusable learning objects

may be tailored to fit a variety of age groups, giving us the most benefit from our budget. Today's children are more technologically aware than ever before. Even the tiniest youngsters have most certainly used an iPad or smartphone. The majority of children regard technology as a recreational activity rather than a learning tool. By introducing digital learning into the classroom, students are given the chance to study in a fun, productive, and participatory way.

There must be enough learning objects generated for teachers to use them regularly across many disciplines for them to be successful. Teachers' needs must be researched thoroughly, and the design must be tailored to their own students. Finally, learning objects will be useless if teachers are unable to locate them. Each learning object must be precisely specified in order for teachers to locate the appropriate object at the appropriate moment.

Hence, the researcher emphasized the necessity of involving teachers from the first day in any planning for designing and employing learning objects in educational institutions, and this is what the current research seeks.

2.2. learning objects Limitations and challenges

Despite the benefits of learning objects, there are several limitations that may prevent achieving those benefits, these include the lack of metadata that facilitates access to learning objects or even the suitability of its content to learners, as mentioned by Apoki (2019) the lack of metadata of the learning objects, prevents access to many of them. Celinski (2017) also pointed out obstacles related to intellectual property rights and copyright preservation, weak infrastructure, in addition to financial, economic, and technical obstacles related to indexing services and standards. This is because there is a fear from some participants regarding the theft of products. This created another obstacle, which is the reluctance to participate in making objects and making them available via the Internet.

Also, Apoki (2019) explained that the lack of applying quality criteria in the production process, in addition to linguistic, geographic, and cultural limitations. A learning object that may be suitable for a study subject in Britain might not be suitable for the same subject in the Sultanate of Oman.

As for pre-university educational institutions in the Sultanate of Oman, there are some challenges and obstacles that hinder the use of learning objects; on the government level, (1) the absence of governmental encouragement for educational institutions and their research centers to develop learning objects, (2) their lack of awareness about the importance of publishing, sharing, and re-using learning objects in building knowledge, (3) the difficulty of preparing and producing learning objects and compiling content, as it requires time, effort, skills, accuracy, efficiency, and high cost to build and develop it by specialized designers, (4), the lack of support from those involved in the educational process, which negatively affects the budget of institutions in the case they desire to produce high-quality learning objects, which need programs, tools, software, and specialized technical training courses, (5) The absence of financial incentives for researchers and contributors to the production of e-content for learning objects, (6) and fear of theft and plagiarism of scientific content and insufficient awareness of intellectual property rights issues and copyright.

The researcher believes that to overcome these obstacles and challenges facing the production of e-learning objects, it is necessary to raise the awareness of the importance of e-learning objects by activating a clear role for them in providing the various digital materials established by the institution, make e-learning objects available in an open form so that their contents are easily accessible through different search engines and without setting restrictions or requirements, seek the assistance of experts and specialists in evaluating digital content and learning objects before allowing them to be made available to ensure their efficiency, quality and the added value that contributes to achieving them for the beneficiaries, and finally activate the role of security to preserve intellectual property rights and setting conditions for the circulation of information through digital repositories.

2.3. Structure of Learning Objects

As for the design of learning objects, Redmond (2018) noted that they contain three main components, (1) Instructional Content, (2) Learning Activities, and (3) Self-Assessment. Also, Rutkauskiene (2019) mentioned, that educational content may be designed through using text, still / animated images, video and audio, and the learning object can include questions, answers, feedback, and glossary besides the content. Rutkauskiene also indicated the need to design short learning objects, not to exceed 15 minutes, and simple layouts to easily navigate the objects.

Moreover, Mourão and Netto (2019) referred to a set of standards that govern the design and functionality of learning objects, among the most important of these criteria are: (1) An easy-to-use educational component content browsing system, (2) Well-organized content and easy access to information, (3) Using appropriate types and size of fonts and attractive colors, (4) The quality of the media used and the possibility of playback (video, audio, animated films, ...), (5) User-friendly interface, (6) Provide for interaction between learners and the content of the object, (7) The educational content should be free from spelling and grammatical errors, (8) Accuracy in the validity of the educational content, (9) Currency of information in the educational content, (10) Provide set of instructions and assistant according to learners' needs, (11) Refer to reliable and credible references and sources, (12) Contribute to the users' understanding and assimilation of the concepts and topics they provide, (13) Provide opportunities to learn higher order thinking skills, and (14) Provide immediate and direct feedback.

Costea (2019) dealt with the main structure of learning objects, confirming that all those interested in learning objects did not agree on a unified structure for them, as they range from a video or animation, to complete units or lessons, but everyone agreed that it is a continuum of several components including: text, image, audio, video / animation, activities, reviews. Dorça added that the designers of learning objects must consider a set of considerations as follows: First: Learning Objectives: The educational component must achieve one educational goal, or a limited number of goals. Second: Content: The content must be concise and direct and achieve the goal. The content may be text, video and audio, interactive medium, or a mixture of them. The element content review time ranges between 10: 15 minutes. The content organization is consistent and uniform across all segments of the Learning Object. Third: Practice: The learning elements provide opportunities for learners to review facts, concepts and key principles through exercises, educational games, simulations, and problem solving. Fourth:

Assessment: The educational object must include an assessment of whether the learner has achieved the declared educational goal or not, and in this it can use the traditional form of assessment such as multiple-choice questions, right and wrong, or the non-traditional form such as games and simulations. (Dorça et al., 2017)

3. Methodology

3.1. Participants

The current study used a descriptive approach to investigate the need for developing a learning objects generator, so that teachers in Omani schools can easily produce high quality learning objects. To do so, (120) teachers were selected randomly to find out the need for it.

The sample included different subjects taught in schools with 44% female and 56% male teachers. In addition, the sample's years of experience were almost evenly distributed as follows: 26.1% have work experience from 1 to 5 years, 22.6% have work experience from 6 to 10 years, 23.5% have work experience from 11 to 15 years, 27.8% have work experience more than 11 years. Finally, (78%) of them have not received any training on designing and producing learning objects.

3.2. Research tool

A questionnaire was created to elicit information about the four research questions based on the literature review and the researcher's experience. The questionnaire was created using five-point Likert scales and was divided into four sections as follows: section one covers "the need for using learning objects" items 1–10, section two covers "teachers' knowledge of designing and producing learning objects" items 11–16, section three covers "teachers' skills of designing and producing learning objects" items 17–22, and section four covers "the need for designing a learning object generator" items 23–28.

3.3. Research procedures

After designing the questionnaire, the validity and reliability were tested. The validity was tested by asking experts in the field, who recommended that teachers be informed about what "Learning Objects" and "Learning objects generator" mean before filling out the questionnaire. As a result, the meaning of the two terms were written in the survey's introduction. The survey was piloted on 18 teachers with different years of experience to ensure its reliability. The Cronbach alpha coefficient was found to be (0.83), indicating that the scale is reliable. Finally, the questionnaire was distributed to 120 randomly selected teachers from various schools in Muscat.

4. Results:

A survey of 120 teachers from Muscat's various schools was conducted to answer the research questions. Participants were asked to respond to 28 statements using a 5-point Likert-type scale, with '5' representing 'Strongly Agree' and '1' representing 'Strongly Disagree.'

4.1. Teachers' perceptions about the need for using learning objects

The first part of the survey seeks to address the following research question: “What are teachers’ perceptions about the need for using learning objects in teaching and learning?”. The frequencies and percentages of participants' responses to each statement are represented in Table (1).

Table 1. Teachers’ perceptions about the need for using learning objects

SD=Strongly Disagree. D=Disagree. N=neutral. A=Agree. SA=Strongly Agree		Frequencies, (percentages)				
Statement		SA	A	N	D	SD
1	Learning objects help me apply different teaching methods.	28, (23.3%)	49, (40.8%)	14, (11.7%)	18, (15%)	11, (9.2%)
2	Learning objects can be re-used in different educational contexts.	18, (15%)	45, (37.5%)	23, (19.2%)	22, (18.3%)	12, (10%)
3	Learning objects help me use different forms of assessment like self-assessment.	26, (21.7%)	50, (41.7%)	13, (10.8%)	20, (16.7%)	11, (9.2%)
4	Learning objects help me introduce educational content to students in a more organized way to facilitate their learning.	24, (20%)	69, (57.5%)	20, (16.7%)	4, (3.3%)	3, (2.5%)
5	Learning objects enriches the educational content by different types of multimedia.	47, (39.2%)	65, (54.2%)	6, (5%)	2, (1.7%)	-
6	Learning objects helps in raising the students’ motivation to learn.	25, (20.8%)	71, (59.2%)	18, (15%)	4, (3.3%)	2, (1.7%)
7	Learning objects helps in meeting individual differences between students.	25, (20.8%)	68, (56.7%)	20, (16.7%)	4, (3.3%)	3, (2.5%)
8	Learning objects are easily accessible for students anywhere and anytime.	39, (32.5%)	58, (48.3%)	11, (9.2%)	6, (5%)	6, (5%)
9	Using Learning objects can enhance the learning environment to be more interactive.	48, (40%)	64, (53.3%)	5, (4.2%)	3, (2.5%)	-
10	Learning objects contain main learning components in a stand-alone entity.	23, (19.2%)	71, (59.2%)	17, (14.2%)	6, (5%)	3, (2.5%)

According to table (1), benefits of learning objects to students in general was the priority for teachers where they agreed that learning objects are easily accessible for students anywhere and anytime (80.8%; n=97). And helps in raising students; motivation to learn (80%; n=96), as they meet the individual differences between them (77.5%; n=93).

In the next priority, teachers reported the benefits of learning objects to content, where learning objects can enrich the educational content by different types of multimedia (93.3%; n=112). And introduce the educational content to students in a more organized way which helps in facilitating learning (77.5%; n=93).

In the third group of priority, teachers reported the benefits of learning objects to the learning environment itself, where they contain all main learning components in a stand-alone entity (78.4%; n=77) which provide an interactive learning environment (93.3%; n=112).

The least priority perceived by the participants was the benefits to teachers themselves. They reported that learning objects help them apply different teaching methods (75%; n=90) and assessment (63.3%; n=76), as teachers can re-use them in different educational contexts (52.5%; n=63).

Also, it is noticed that two statements were reported in the first rank by the teachers. Most of the teachers agreed and strongly agreed that using learning objects can enrich the educational content by different types of multimedia (i.e. text, image, sound, video, animation...etc.) (93.3%; n=112). Also, they can enhance the learning environment to be more interactive (93.3%; n=112). The positive response to both statements indicate that teachers view learning objects as a mean for introducing the content to learners in a different rich format that will increase the engagement with the content.

Generally, it is clear from table (2) that the total view of the participants about the need for using learning objects in teaching and learning tends to be very positive with (76.08%), total mean score (3.85) and standard deviation of (0.66).

Table 2. Total teachers' perceptions about the need for using learning objects

Theme	Percentage					Mean	St. D
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree		
Total need for using learning objects	25.25%	50.83%	12.25%	7.42%	4.25%	3.85	0.66

4.2. Teachers' perceptions about their knowledge of designing and producing learning objects

The second part of the survey seeks to address the following research question: "What are teachers' views about their knowledge of designing and producing learning objects to be used in their teaching?". The frequencies and percentages of participants' responses to each statement are represented in Table (3).

Table 3. Teachers' perceptions about their knowledge of designing and producing learning objects

SD=Strongly Disagree. D=Disagree. N=neutral. A=Agree. SA=Strongly Agree		Frequencies, (percentages)				
Statement		SA	A	N	D	SD
1	I know the principles of designing a complete learning object to help me achieve learning objectives.	5, (4.2%)	9, (7.5%)	24, (20%)	59, (49.2%)	23, (19.2%)
2	I can design a complete script for the needed learning object.	-	-	2, (1.7%)	65, (54.2%)	53, (44.2%)

3	I know the instructional design principles for designing learning objects.	4, (3.3%)	9, (7.5%)	25, (20.8%)	60, (50%)	22, (18.3%)
4	I am aware of different styles used to present educational content in learning objects.	2, (1.7%)	9, (7.5%)	15, (12.5%)	67, (55.8%)	27, (22.5%)
5	I am aware of the technical and educational standards for designing learning objects.	-	2, (1.7%)	6, (5%)	70, (58.3%)	42, (35%)
6	I know how to design different forms of learning objects.	2, (1.7%)	10, (8.3%)	18, (15%)	64, (53.3%)	26, (21.7%)

As shown in table (3), teachers' perceived knowledge about designing and producing learning objects is reported low where most teachers disagreed and strongly disagreed about many aspects. Knowledge about writing scripts of learning objects came in the first rank (98.3%; n=118). And being aware of the technical and educational standards for designing learning objects came in the second rank (93.3%; n=112). This implies that teachers lack the principal knowledge about designing learning objects.

Also, it is clear from the results that they lack basic knowledge about designing learning objects related to the following: different styles used to present educational content (78.3%; n=94), designing different forms of learning objects (75%; n=90), the instructional design principles (68.3%; n=82), and the principles of designing a complete learning object (68.3%; n=82). All these items were disagreed and strongly disagreed by most teachers.

In general, teachers' perceived knowledge can be described as very low as reported by teachers in table (4), where only (7.23%) of them agreed and strongly agreed that their knowledge in this area is high, total mean score (2.02) and standard deviation (0.64). This implies that teachers lack training in this area.

Table 4. Total teachers' perceptions about their knowledge of designing and producing learning objects

Theme	Percentage					Mean	St. D
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree		
Total Knowledge	1.81%	5.42%	12.50%	53.47%	26.81%	2.02	0.64

4.3. Teachers' perceptions about their skills of designing and producing learning objects

The second part of the survey seeks to address the following research question: "What are teachers' perceptions about their skills of designing and producing learning objects to be used in their teaching?". The frequencies and percentages of participants' responses to each statement are represented in Table (5).

Table 5. Teachers' perceptions about their skills of designing and producing learning objects

SD=Strongly Disagree. D=Disagree. N=neutral. A=Agree. SA=Strongly Agree	Frequencies, (percentages)
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Statement		SA	A	N	D	SD
1	I can easily produce a complete learning object to use in teaching.	-	1, (0.8%)	2, (1.7%)	74, (61.7%)	43, (35.8%)
2	I can use the suitable software to design different forms of assessment and feedback.	5, (4.2%)	11, (9.2%)	18, (15%)	54, (45%)	32, (26.7%)
3	I can use design applications for multimedia to produce a learning object.	1, (0.8%)	4, (3.3%)	6, (5%)	66, (55%)	43, (35.8%)
4	I can use edit applications to edit different types of multimedia included in the learning object.	4, (3.3%)	8, (6.7%)	23, (19.2%)	49, (40.8%)	36, (30%)
5	I can easily produce interactive content and activities for learning objects.	1, (0.8%)	3, (2.5%)	11, (9.2%)	65, (54.2%)	40, (33.3%)
6	I can publish the learning objects in different formats to facilitate dissemination.	10, (8.3%)	12, (10%)	27, (22.5%)	48, (40%)	23, (19.2%)

As shown in table (5), teachers' perceived skills about producing learning objects is reported low. The majority of teachers disagreed and strongly disagreed about many aspects of the survey.

Skills about producing a complete learning object (97.5%; n=117). And using "design applications for multimedia" to produce a learning object (90.8%; n=109) came in the first two ranks respectively.

Teachers agreed that they are not able to neither produce interactive content and activities for learning objects easily (87.5%; n=105), nor using the suitable software to design different forms of assessment and feedback (71.7%; n=86). Also, they are not able to use "edit applications" to edit different types of multimedia included in the learning object (70.8%; n=85) or publish learning objects in different formats to facilitate dissemination (59.2%; n=71)

In general, teachers' perceived skills can be described as very low as reported by them in table (6), where only (8.34%) of them agreed and strongly agreed that their skills in this area is high, total mean score (2.02) and standard deviation (0.65). This implies that teachers are not practicing the production of learning objects. This is understandable given their lack of training in this area, with 78% of teachers reporting that they had not got any training in the design or production of learning objects.

Table 6. Total teachers' perceptions about their skills of designing and producing learning objects

Theme	Percentage					Mean	St. D
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree		
Total Skills	2.92%	5.42%	12.08%	49.44%	30.14%	2.02	0.65

4.4. Teachers' perceptions about the need for designing a learning objects generator

The second part of the survey seeks to address the following research question: "What are teachers' perceptions about the need for designing a platform for helping them easily produce learning objects?".

The frequencies and percentages of participants' responses to each statement are represented in Table (7).

Table 7. Teachers' perceptions about the need for designing a learning objects generator

SD=Strongly Disagree. D=Disagree. N=neutral. A=Agree. SA=Strongly Agree		Frequencies, (percentages)				
		SA	A	N	D	SD
Statement		SA	A	N	D	SD
1	The presence of learning objects generator will raise the motivation for teachers to create many learning objects.	32, (26.7%)	50, (41.7%)	25, (20.8%)	8, (6.7%)	5, (4.2%)
2	The presence of a platform to guide me will help me overcome any shortcomings to produce learning objects.	44, (36.7%)	73, (60.8%)	2, (1.7%)	1, (0.8%)	-
3	The presence of learning objects generator will provide me with many ideas to produce learning objects.	41, (34.2%)	64, (53.3%)	12, (10%)	2, (1.7%)	1, (0.8%)
4	The presence of learning objects generator will give me the opportunity for changing my teaching style depending on using interactive content.	26, (21.5%)	48, (40%)	24, (20%)	12, (10%)	10, (8.3%)
5	The presence of learning objects generator will help me save time and effort in producing learning objects by myself.	42, (35%)	67, (55.8%)	7, (5.8%)	3, (2.5%)	1, (0.8%)
6	The presence of learning objects generator will guarantee producing high quality learning objects regardless my technical skills.	33, (27.5%)	53, (44.2%)	17, (14.2%)	12, (10%)	5, (4.2%)

According to table (7), most participants agreed and strongly agreed that the presence of a “learning objects generator” will help them in the first place to overcome any shortcomings to produce learning objects (97.5%; n=117). Then they reported that it will help them save the production time and efforts (90.8%; n=109) and will provide them with many ideas to produce learning objects (87.5%; n=105). This confirms how teachers perceive their knowledge and skills about producing learning objects by themselves and the long time and effort it can take from them.

Moreover, teachers reported that the generator will help them produce high quality learning objects (71.7%; n=86), raise their motivation (68.3%; n=82), and give them the opportunity for changing my teaching style (61.7%; n=74).

In general, this section indicates the need for designing a platform for helping them easily produce learning objects as reported by teachers. It is obvious from table (8) that total perceptions of the teachers for the whole section tends to agree about using a “learning objects generator” (79.59%), with total mean score (3.98) and St. D. of (0.65).

Table 8. Total teachers' perceptions about the need for designing a learning objects generator

Theme	Percentage	Mean	St. D
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	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree		
Total need for designing generator	30.28%	49.31%	12.08%	5.28%	3.06%	3.98	0.65

5. Discussion

The results of a questionnaire administered to 120 teachers from various disciplines revealed a clear benefit for using learning objects to improve learning and teaching in Omani schools from the perspective of teachers. Also, it revealed a need for having a learning objects generator that help teachers produce high quality learning objects without the need to have specialized technical skills.

If we deeply look to the results of the first section of the survey describing “Teachers’ perceptions about the need for using learning objects”, we can easily spot that the three items (item 1, 2, and 3), related to learning objects needs for teachers, were reported in the lowest rank in their priority. However, they were expected to be the first three items in the rank as they are related to teachers themselves. This might point to the lack of knowledge and training about how teachers can re-use learning objects in different educational contexts and how they can utilize them to apply different teaching methods and assessment. This is confirmed in the background information reported by teachers where only 22% of them received training in designing and producing learning objects. Also, it is confirmed from the results of sections two and three in the survey related to teachers’ knowledge and skills respectively, where teachers reported low knowledge about designing principles and standards of learning objects. They were not sure about knowing how to complete a script or design different forms of learning objects and different styles to present the educational content. Also, teachers reported low skills of producing complete learning objects with interactive content and activities as well as using different types of software that can help in multimedia design, edit and producing different forms of assessment and feedback. Such deficiency in their knowledge and skills might be justified in light of the limited training rates and number of targeted trainees provided by the Ministry of Education (Governmental report, 2022).

The study results can be understood through applying the TPACK framework which refers to three main knowledge that any teacher must possess in order to be able to effectively employ any technological application without having to design it himself (Yeh, et.al. 2021). See figure 1

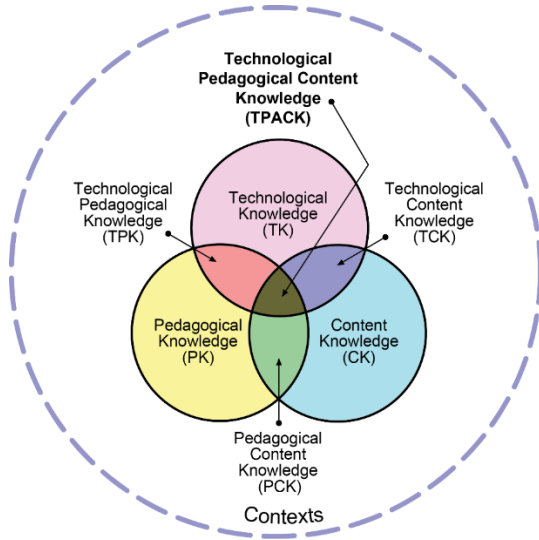


Figure 1. TPACK framework Reproduced by permission of the publisher, © 2012 by tpack.org

Teachers possess the knowledge about content (CK) as being subject matter experts, and they are aware with the pedagogical issues (PK) as well as the knowledge related to introducing content to their students using the suitable teaching methods (PCK). However, it is clear from the results that teachers lack the knowledge about technology (TK) which is related to designing and producing learning objects, and its relationship with taught content (TCK) and pedagogy (TPK). See figure 2.

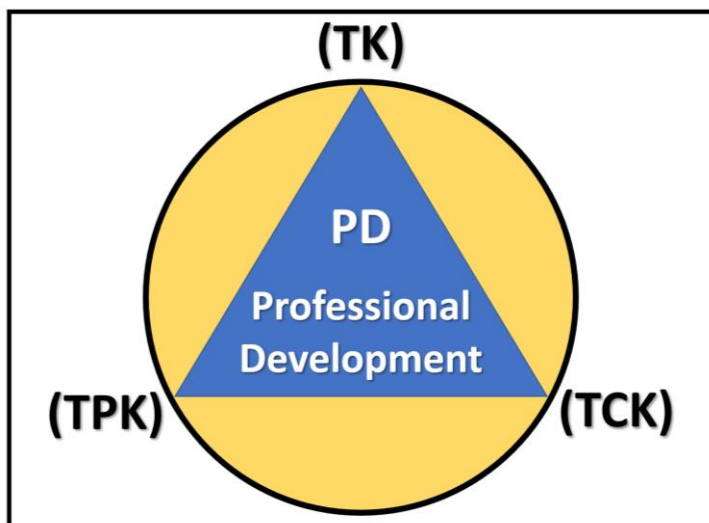


Figure 2. Weak aspects in teachers’ level based on TPACK model

This implies that teachers’ professional development can concentrate more on the three aspects stated in figure 2. By doing this, teachers will be provided with the necessary knowledge before starting the process of designing and developing learning objects. This will help teachers to effectively teach using learning objects and engage their students more with technology.

The idea of developing a generator for learning objects is supported by teachers' strong desire for the presence of a platform to guide them overcome any shortcomings they possess to produce learning objects, and able to provide different ideas to produce high quality learning objects in less effort and time. This generator also can overcome many problems related to teachers' lack of training, knowledge, and skills about designing and producing learning objects.

Accordingly, the current study suggests developing a generator for learning objects as seen in figure 3

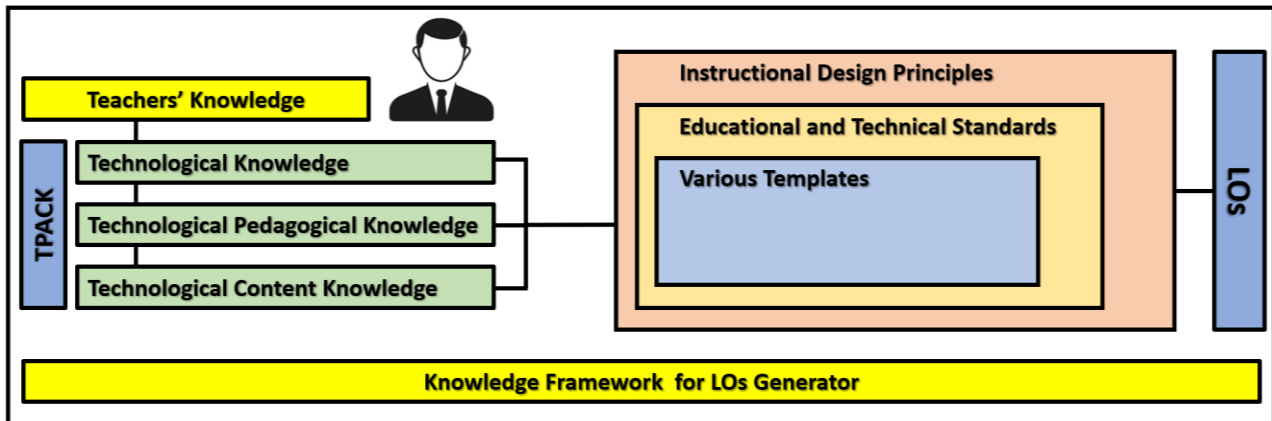


Figure 3. The suggested knowledge framework for LOs Generator

The learning objects generator should be designed on the principles of instructional design and inform the suitable educational and technical standards to ensure the quality of production. Also, it should provide teachers with different templates to easily add content, activities, and questions. So, teachers will only represent the subject matter expert who feeds the generator with the basic information of the required learning object without the need to acquire any technical skills. Then the generator will be able to assemble all the components received from the teacher and combine them in a complete packaged learning object.

To develop a plan to employ learning object in Omani schools, it was necessary to refer to some studies, including (Li et al., 2106; Choi, 2018; Medina et al., 2018; Hernández-Leal et al., 2017; Gudoniene et al., 2017; Costea et al., 2018), and the plan was formulated in light of the system approach as follows: (also see figure 4)

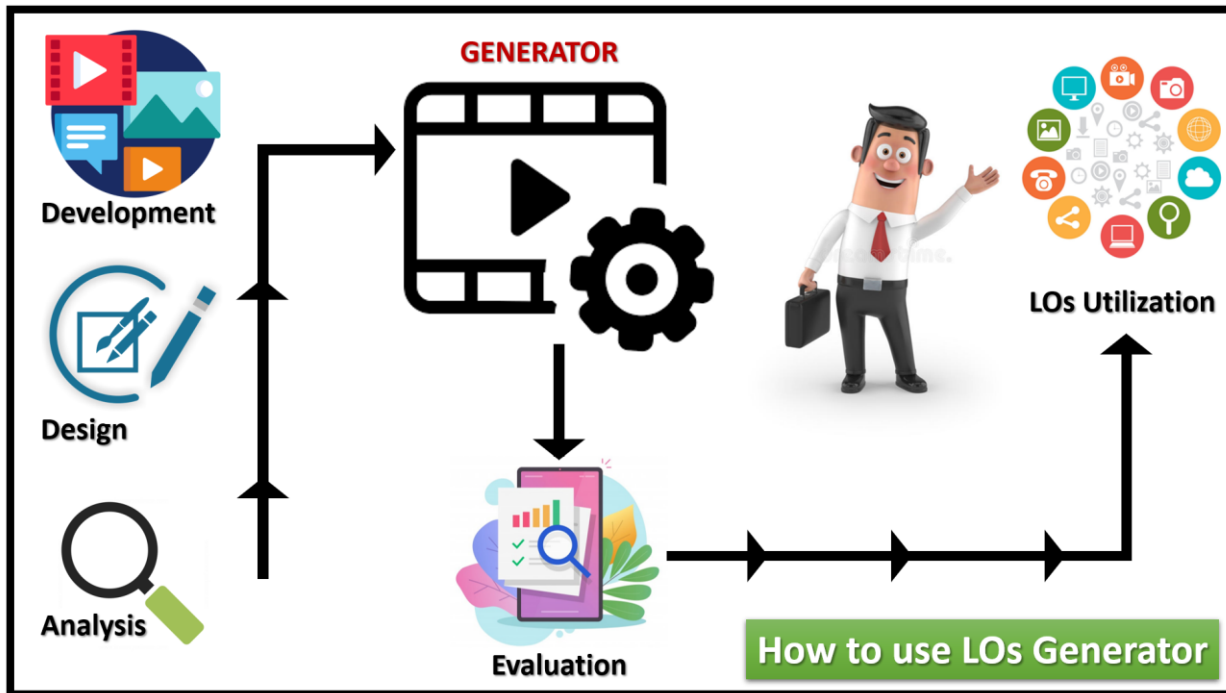


Figure 4. How to use LOs Generator through the system approach

First: Analysis phase:

Inputs: Determining learners' needs, analyzing learners' characteristics, analyzing educational content, analyzing educational resources. Processes: At this stage, the needs of learners are analyzed by conducting a test, questionnaire, interviews, records, or discussions, etc. to know the needs of learners. Also, analysis of educational content into knowledge and what it includes of facts, concepts and principles, aspects of kinesthetic or mental skills, and emotional aspects such as trends, tendencies, and values. Outputs: Accurate knowledge of learners' needs and characteristics, educational content and available educational resources or resources.

Second: Design phase:

Inputs: Accurate knowledge of learners' needs and characteristics, educational content, and available educational resources. Processes: At this stage, the behavioral objectives are formulated in light of the general objectives in a measurable, clear and accurate manner. The elements of the educational content are identified and organized in proportion to the educational objectives and in a sequential manner and achieves the principle of continuity and integration and from simple to complex, defining education strategies and learning methods such as individual or group learning, Designing multimedia such as texts, images and videos prepared using specific software, and images or downloading them from the Internet and processing them with appropriate programs, choosing links related to content and supporting learning. Outputs: Clear behavioral objectives structured and sequential educational content, appropriate teaching strategies and learning methods, various multimedia, and assessment tools.

Third: Development of learning object components phase:

Inputs: Clear behavioral objectives structured and sequential educational content, appropriate teaching strategies and learning methods, various multimedia, and assessment tools. Processes: At this stage, learning objects components are produced where texts are written and images are produced, captured, or imported as educational assets and video production. Outputs: Produced Learning Objects components.

Fourth: Using the LOs Generator phase:

Inputs: Produced Learning Objects components. Processes: At this stage, the learning object is designed and produced by using the pre-produced components, and with the use of the features of the Generator. Outputs: Produce an integrated learning object.

Fifth: Evaluation phase:

Inputs: Produce an integrated learning object. Processes: At this stage, the learning object is tested on a small exploratory sample to identify and fix defects, then the expanded application through a large exploratory sample to ensure that the learning object is free of defects, and then work on making it available through digital repositories on the Internet. Outputs: Produced Learning Object, evaluated and available to use.

Sixth: Utilization phase:

Inputs: Produced Learning Object, evaluated and available to use. Processes: field use in the resource room or the school's computer lab, where students begin to use the learning object, with continuous follow-up and evaluation to ensure the effectiveness and efficiency of the learning object, and the feedback that accompanies all previous stages for improvement and development. Outputs: Produced Learning Object, evaluated and available to use on the internet in a repository.

6. Conclusion and Future Work

Learning objects are among the most digital solutions that can enhance teaching and learning due to their small size, high interactivity, and they contain main learning components in a stand-alone entity. Although teachers can clearly notice the benefits of using learning objects with their students, their knowledge, and skills about designing and producing learning objects were reported very low according to the results presented. They appreciate so much the idea of having a platform to guide them in designing and developing high quality learning objects without the need to possess high technical skills. Thus, the current study recommended to develop a learning objects generator so that teachers can be able to concentrate on the educational elements needed to be included in the learning objects.

The current study helps in establishing the concept of free access to educational digital content through an Omani educational platform based on standards and principles consistent with the nature and needs of the education community in the Sultanate of Oman. Also, it enables Omani teachers to publish their lessons, implement educational activities, and share educational content with their students, which in turn will help in achieving intended learning outcomes.

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